

EDI SOFTWARE PRODUCTS :
ISSUES, MARKETS, TRENDS

INPUT

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Electronic Data Interchange Program (EDIP)

EDI Software Products: Issues, Markets, and Trends

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Abstract

This report, one of a continuing series, describes in depth EDI's functions, the relationship of EDI to other software systems, and provides a comparison of EDI varieties. It reports survey-based findings on issues such as software features wanted, user concerns regarding standards, integration, vendor viability, and other factors.

An examination of EDI software market directions including trends in pricing, distribution, partnering relationships, standards, and strategies is provided. The report concludes with a market forecast for EDI software on each equipment platform (micro, mini, mainframe); identifies specific opportunities; and contains detailed recommendations for vendors and users.

The study contains 135 pages including 63 exhibits and three appendixes.



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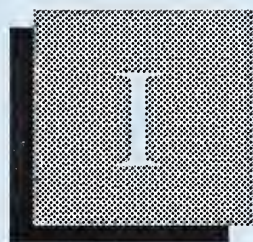
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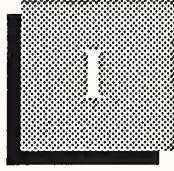
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Introduction





Introduction

A

Background

This report, produced by INPUT's Electronic Data Interchange Program (EDIP), examines Electronic Data Interchange (EDI) software with a focus on packages that translate to the American National Standards Institute's EDI formats, known collectively as ANSI X12.

INPUT defines EDI as the intercompany electronic transfer of business information between applications in a structured format conforming to a public or de-facto standard (Exhibit I-1). The information represents standard business documents, such as invoices, purchase orders, and logistical information. EDI techniques are also used for other applications such as health insurance claims.

EXHIBIT I-1

ELECTRONIC DATA INTERCHANGE

The Application-to-Application Exchange
of Intercompany Business Data in Standard Formats

Excluded from the analysis is software supporting "dedicated" applications such as electronic shopping, Automatic Teller Machine (ATM) networks, point of sale (POS) terminals, and airline reservation systems.

- Arguably, these systems use electronic “forms” to transfer information; however, these applications generally use specialized terminal devices to communicate with dedicated computers.
- Additionally, these applications are not generalized computer-to-computer, application-to-application implementations, and they tend to use proprietary data formats rather than public standards.

EDI commonly involves the transmission of data in one of several standard formats, with ANSI X12 emerging as the dominant standard. In most cases, data from installed applications are translated to the standard prior to transmission. Alternately, a third-party service may perform on-network translation. It is usually necessary for the data to be translated again into formats recognized by a trading partner’s computer applications.

In the past, EDI has been implemented using private standards.

- Commonly agreed upon standards, such as ANSI X12, are now being used, with adaptations, by many industries.
- The use of standards allows communications across industry lines, thus paving the way for additional information interchange applications.

Many users are just getting started with EDI, others are adding transactions to those they now handle electronically, while still others are looking to integrate EDI functionality with internal applications to optimize its usefulness and benefits.

The reasons for using EDI include the time value of information, cost avoidance, better inventory control, and other benefits from integrating EDI data and corporate information processing.

EDI communications can be configured in several ways: point-to-point, directly between trading partners; on private networks; or through third parties—Remote Computer Services (RCS) or Value-Added Networks (VANs).

VAN and RCS firms serve as collection and switching services that perform store-and-forward tasks (“mailboxing”) and other processing (i.e., consolidations, summary reports, archiving). Communications capabilities are an obviously necessary function in EDI implementations.

EDI is providing new lines of business for software vendors, professional services companies, VANs, and RCS firms. The principal participants are aggressively pursuing EDI accounts and promoting EDI within many industry segments, creating a very competitive market environment.

- In the software area, there are more than 30 providers. In network/processing services, there are approximately 40 companies providing EDI services.
- While opportunities remain to be exploited, profitability has been elusive for many as the competition increases.

However, users ultimately benefit from industry competition through a variety of choices, competitive pricing, and improved features.

B

Scope

The study addresses the following topics:

- An EDI software tutorial, describing its functions, the relationship of EDI to other software systems, and comparing varieties of EDI (Chapter III)
- User concerns and issues: survey-based findings on features wanted, user concerns regarding standards, integration, vendor viability, and other factors (Chapter IV)
- A review of EDI market inhibitors and activators (Chapter V)
- An examination of EDI software markets and directions including trends in pricing, distribution, partnering relationships, standards, and strategies (Chapter VI)
- Market forecasts and opportunities (Chapter VII)
- Recommendations for users and vendors (Chapter VIII)

Chapter II is an Executive Overview of the entire study.

Definitions of EDI-related terms are found in Appendix A

C

Methodology

The research for this report consisted of:

- Corporate Interviews.
 - A structured questionnaire on general Information Systems and Services issues was administered to 210 Information Systems (IS) managers in 14 industries between March and May 1988. This survey collected data on EDI awareness levels and EDI states of readiness in a broad, representative sample of users.

- An additional 85 in-depth telephone interviews were conducted with EDI managers identified in the EDI Yellow Pages and with users of the Electronic Medical Claims and Insurance Interface varieties of EDI. This survey was designed to probe EDI-related issues and intentions among companies already involved with the application. The questionnaire used is in Appendix B.
- Exhibit I-2 shows the sample distribution for these two surveys.
- Vendor Interviews.
 - Interviews were conducted with senior-level management of software providers, VANs, RCS firms, and professional service firms involved in EDI. The questionnaire administered to software vendors is in Appendix C.
- Industry Representatives.
 - Interviews were conducted with industry association representatives and academic observers of EDI developments.
- Product and Service Analysis.
 - INPUT collected and analyzed information on EDI software and services and reviewed secondary research sources.
- Custom Research Projects.
 - INPUT has been engaged for several consulting projects bearing on EDI. Although no proprietary information is revealed, the general industry knowledge gained is represented in this report.

D

Related INPUT Reports

This study is one of a continuing series focused on EDI. Other reports published or planned for the series include:

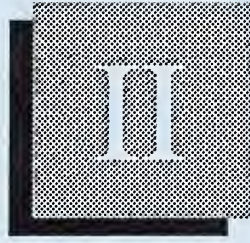
- *EDI Software Product Provider Profiles*
- *EDI Implementation Case Studies*
- *North American EDI Service Market Analysis 1988-1993*
- *North American EDI Service Provider Profiles*
- *Vertical Industry EDI Directions and Potentials*, which examines unique issues and market potentials in approximately 30 industry sectors.

EXHIBIT I-2

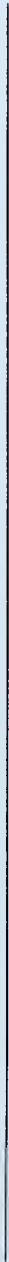
INTERVIEW SAMPLE DISTRIBUTION

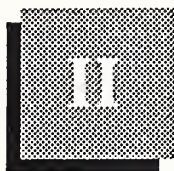
	IS MANAGERS	EDI PROJECT MANAGERS	TOTAL
Discrete Manufacturing	41	32	73
Process Manufacturing	22	19	41
Transportation	15	7	22
Medical	3	2	5
Services	14	-	14
Utilities	17	2	19
Retail	10	7	17
Banking	18	-	18
Wholesale	3	10	13
Insurance	16	4	20
Federal/State Government	28	2	30
Education	16	-	16
Telecommunications	4	-	4
Other	3	-	3
Total	210	85	295

- *EDI in Professional Services*
- *Network Services in Western Europe*, focusing on EDI and EFT applications
- *X.400 and EDI*
- *International EDI Services*
- *Federal Government EDI Initiatives*



Executive Overview





Executive Overview

A

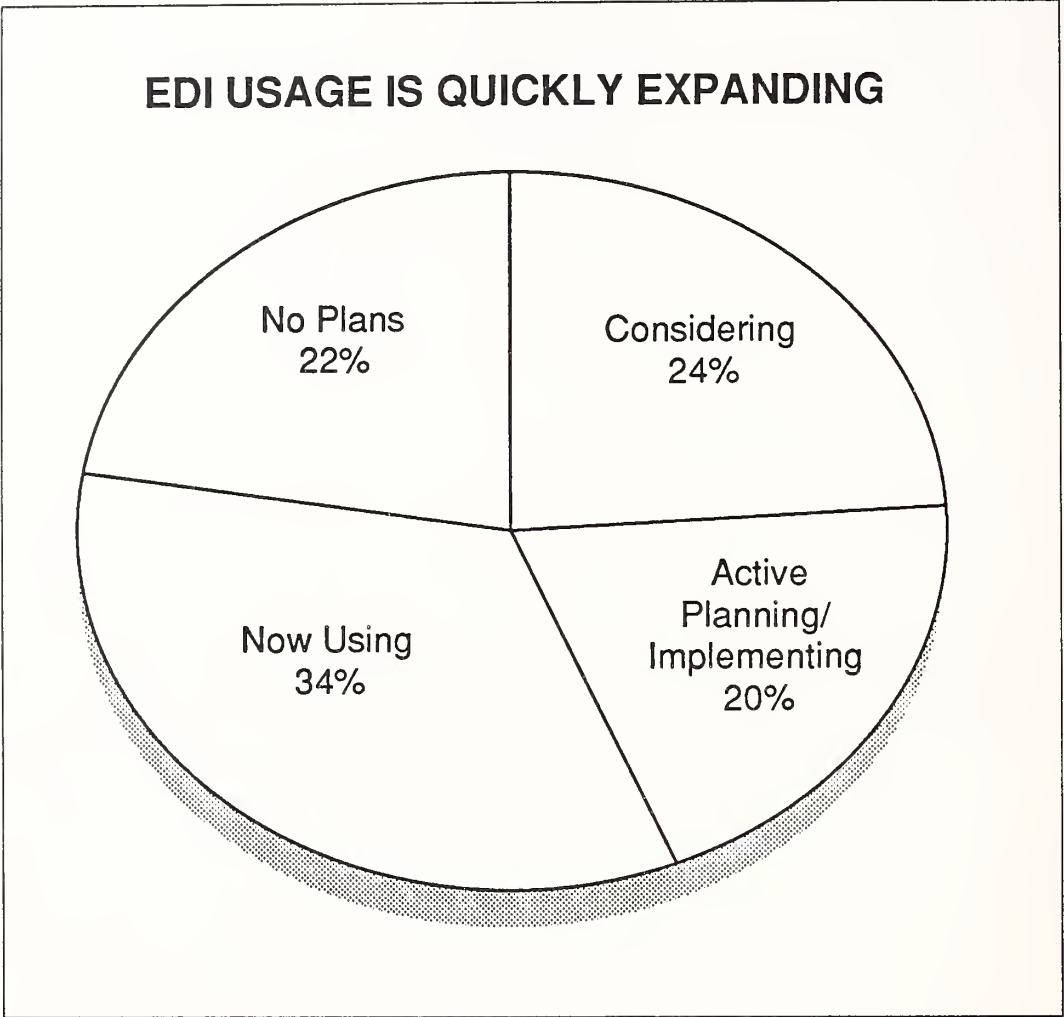
EDI Usage Is Quickly Expanding

Electronic Data Interchange is the electronic transfer of structured business data between the computer applications of different organizations. It is process-to-process communications in machine-readable, standardized formats, that overcome organizational differences in computers, protocols, and data formats.

Although typically used for the transfer of electronic purchase orders, invoices, bills of lading, and data representing other documents, EDI exchanges are also used for electronic health care insurance claims, property/casualty insurance, and other areas.

As Exhibit II-1 shows, INPUT's survey research of Fortune 1000 public and private companies, large universities, and government agencies found 34% of the respondents reporting current EDI usage, with an additional 20% actively planning and implementing EDI applications. Twenty-four percent of the respondents reported they were considering using EDI. The data indicate that at the end of 1988, over half of these organizations are using EDI.

EXHIBIT II-1



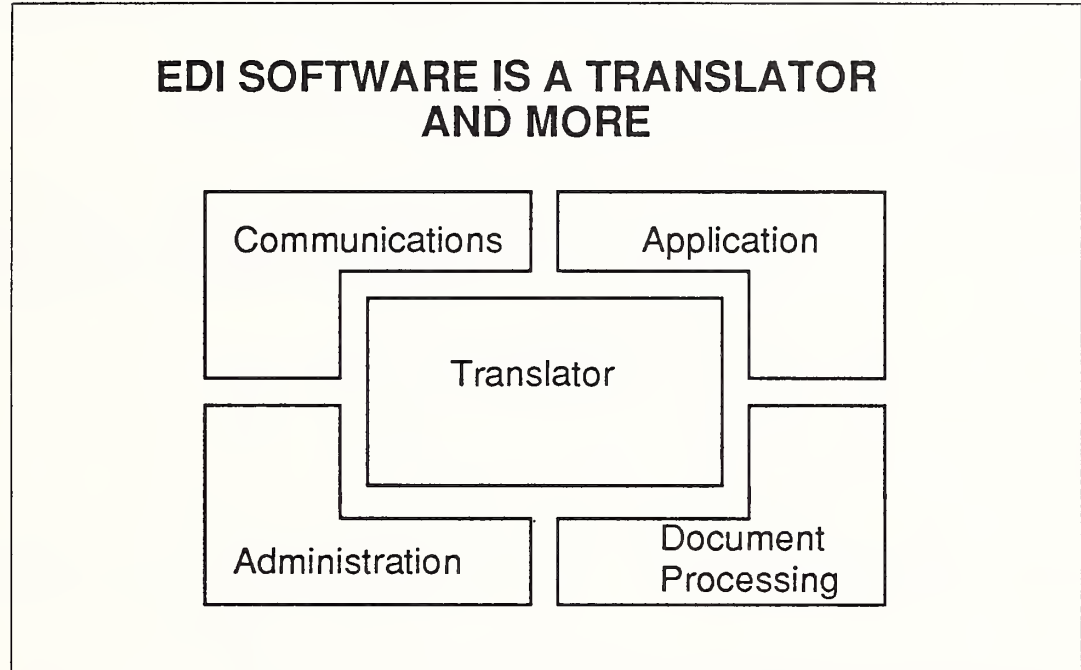
B
**EDI Software Is a
Translator—And
More**

EDI software is minimally a translator that converts data between internally used formats and those required by a trading partner, or between internal formats and commonly agreed upon standard formats. Increasingly, these formats are publicly approved ones such as the American National Standards Institute’s X12 standards (ANSI X12); however, a translator may also convert data into an industry- or company-specific format.

EDI software may also have an associated communications module that handles network links for data transmission and mailbox access through private or third-party networks. In addition, EDI may also support administrative functions, such as maintaining trading partner profiles. Also associated with EDI software is a document processor that manages data input and output. When these several functions are sold as part of a translator package, they are included in the market sizing given in this report.

To optimize EDI's benefits, these individual functions should be fully integrated and EDI software itself should be tightly integrated with corporate applications such as marketing, purchasing, inventory, financial management, and logistics, as illustrated in Exhibit II-2.

EXHIBIT II-2



C

Major Vendors Are Addressing the EDI Software Market

Until this past year, the EDI software market consisted generally of small independent firms, EDI network service providers selling their own or other vendors' packages, smaller applications software vendors that added EDI functionality to their existing software, and distributors.

This past year, several "major" software companies, including McCormack and Dodge, Pansophic, and ASK Computer Systems are taking EDI positions, typically through alliances. These vendors are joining MSA, which licensed and enhanced another vendor's solution for integration with MSA's management and manufacturing applications.

With the exception of Control Data, which offers its own microcomputer software through its EDI service, none of the major computer manufacturers currently offers its own EDI software. However, Digital Equipment Corporation (DEC) has announced products in Europe and will likely be offering EDI software in the U.S. soon.

One of the third-party service providers (McDonnell Douglas) has abandoned selling software and now certifies other vendors' products for use on the network. Other networks, such as Western Union, are also taking this approach.

However, the market's leading network providers, GE Information Services and Sterling Software Ordernet, are offering EDI software

directly. GE Information Services has also entered multiple "EDI Agent" agreements with specialized software firms that receive revenues from traffic they bring to the network.

Some of the major vendors becoming involved in EDI software are shown in Exhibit II-3.

EXHIBIT II-3

MAJOR VENDORS ARE ADDRESSING THE EDI SOFTWARE MARKET

- ASK
- MSA
- DEC
- McCormack and Dodge
- Pansophic
- Etc.

Two characteristics of the EDI software market are its relatively small size and its fragmentation. Given this early stage, there are as yet no clear market leaders. These characteristics mean opportunities remain for vendors to capture market share.

D

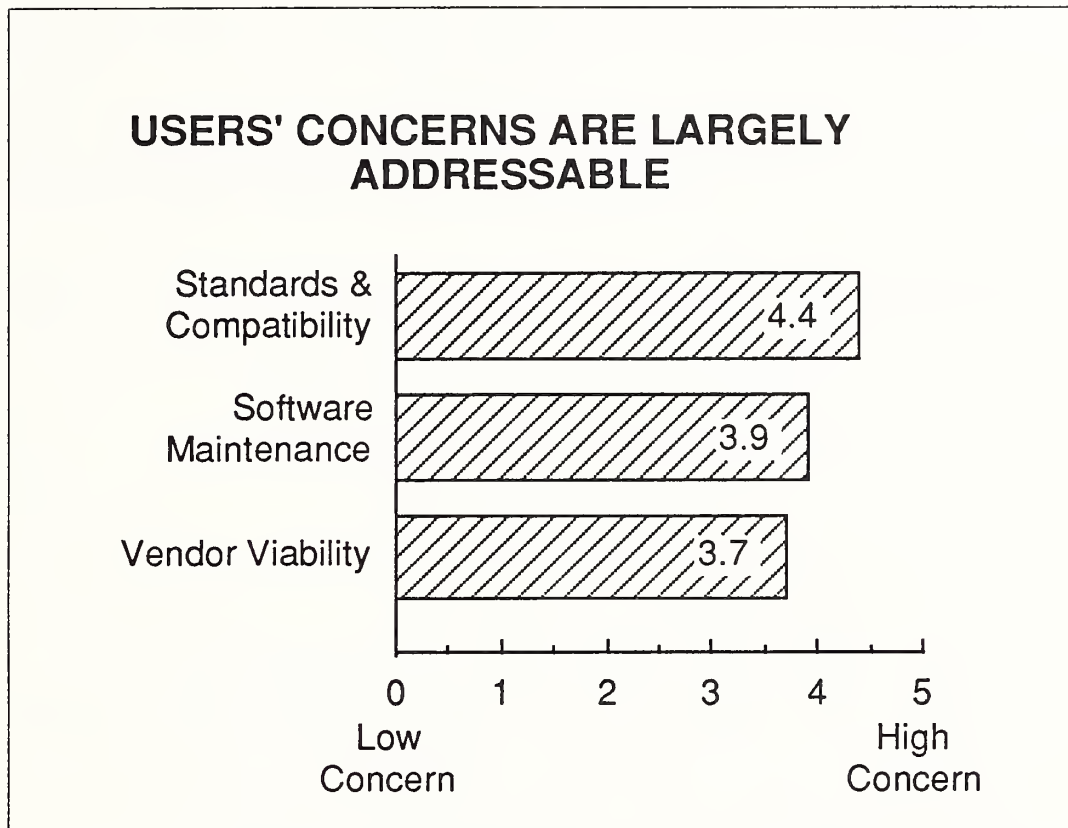
Users' Concerns Are Largely Addressable

As shown in Exhibit II-4, users interviewed by INPUT reported that standards and compatibility were their most important concerns relative to EDI. These concerns reflect uncertainty about:

- How existing, industry-specific standards will evolve.
- A planned "migration" from the dominant ANSI X12 EDI standard to the emerging EDIFACT international standard.
- What the appropriate role of several standards-making bodies will be.

INPUT believes that once users understand the relationships between existing and developing standards, their concerns will diminish.

EXHIBIT II-4



The second-most-important concern, software maintenance, relates to the first. With standards *appearing* to be unsettled, users wonder about the expense and effort of staying up to date.

Users are also concerned about vendor viability. Specifically, they are concerned that the effort and investment incurred evaluating software and service providers, and encouraging trading partners to use a specific vendor, will not have been in vain.

E

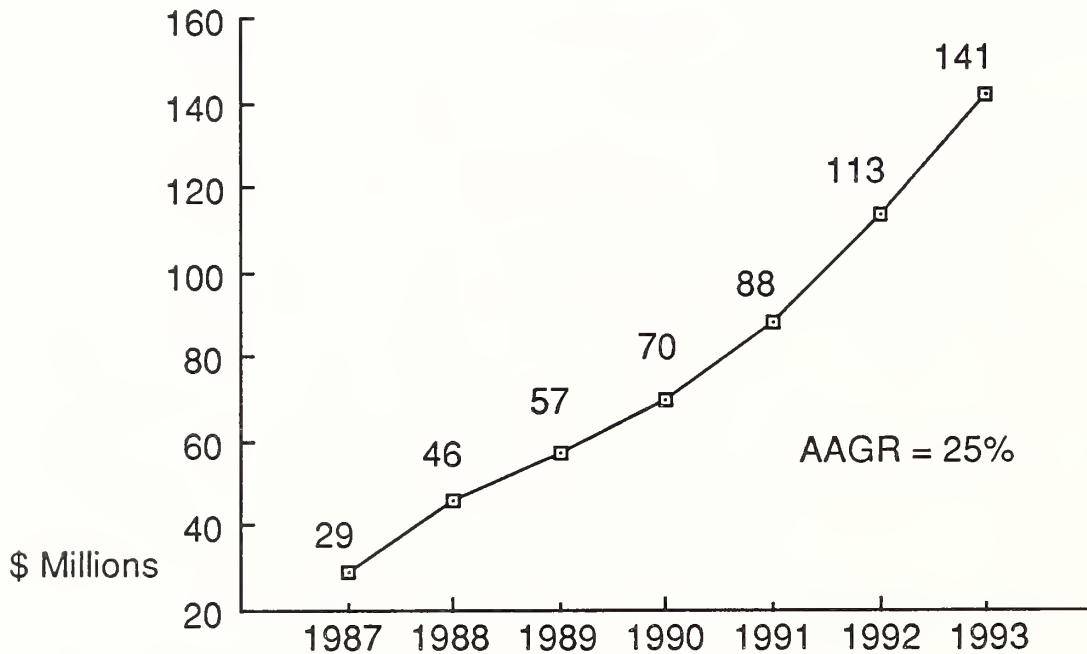
EDI Software—A \$141 Million Market by 1993

The 1987 commercial EDI software market was \$11 million, and will grow at an average annual rate of 44% to become a \$105 million market by 1993. At the same time, the Federal EDI market was \$18 million in 1987, growing at a 4.5% AAGR to become a \$36 million market by 1993. The combined commercial and federal EDI software markets totaled \$29 million in 1987, and will grow at an AAGR of 25% to become a \$141 million market by 1993, as shown in Exhibit II-5.

- The forecast covers only software compatible with the X12 standard.
- INPUT believes new EDI users will predominantly use the X12 standard. Those requiring (and using) earlier formats have already purchased software, or developed it themselves.
- Replacement software will likely support the X12 format (as well as others), permitting a migration to X12 and allowing interindustry trading.

EXHIBIT II-5

EDI SOFTWARE—A \$141 MILLION MARKET BY 1993*



* Commercial and Federal, X12 only.

Software supporting only private standards, industry-specific standards, and applications outside of X12 (such as electronic medical claims, insurance interface, and other forms of EDI) will add incrementally to the market.

Included in the software forecast is an annual maintenance/licensing fee. When communications and other functions directly related to the EDI application are sold with the EDI package, these fees are included.

F

EDI Markets Will Far Exceed the Forecast

The total commercial and federal EDI markets consist of network and processing services, software, and professional services. Even though computer and communications equipment may be dedicated to EDI functionality, INPUT does not include this equipment in the overall market sizing.

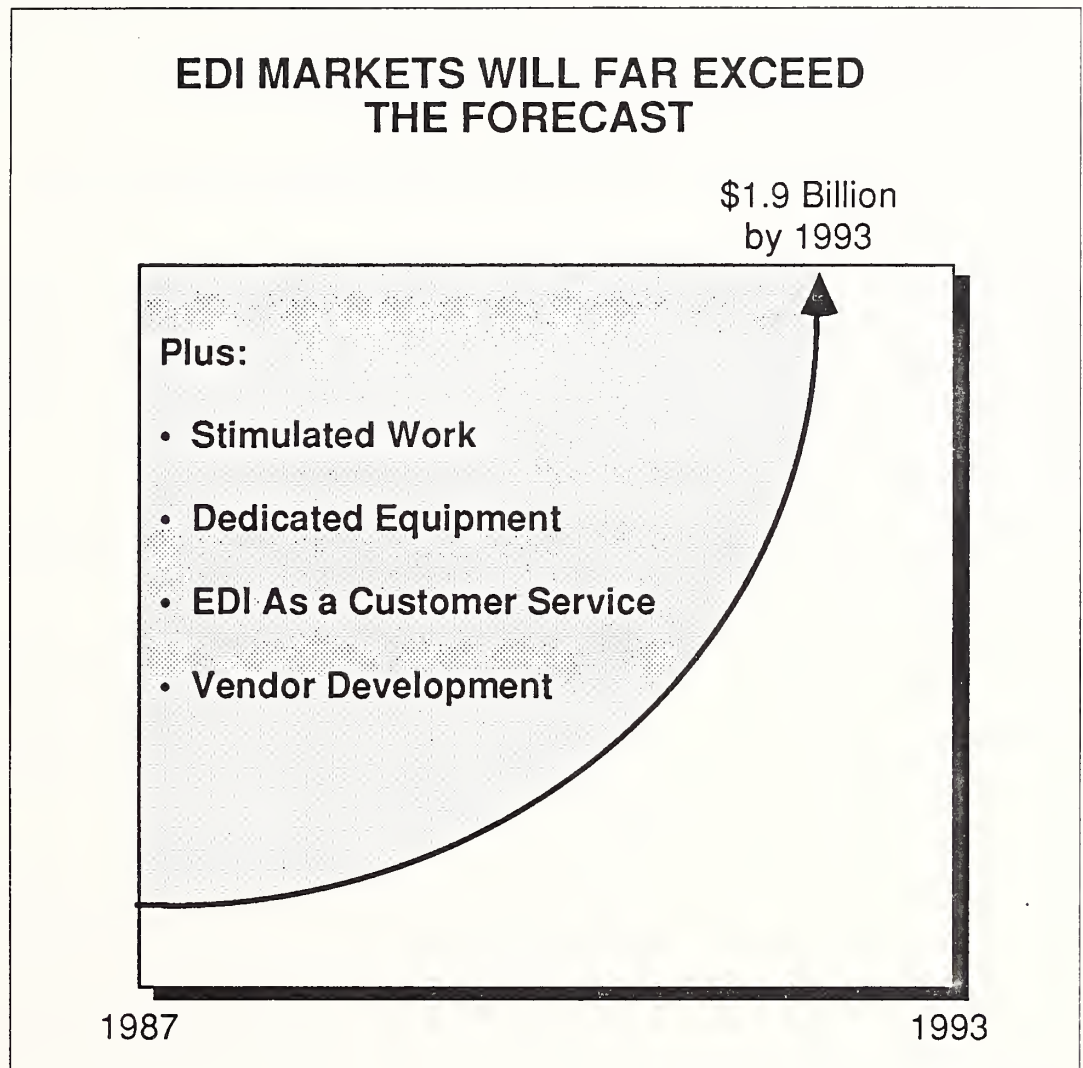
INPUT projects that user expenditures for EDI network services *alone* will grow from \$68 million in 1987 to over \$1.7 billion by 1993, representing an average annual growth rate (AAGR) of nearly 70%. This

forecast includes the electronic medical claims and batch insurance interface varieties of EDI and federal EDI.

When combined with software and professional services, the commercial and federal EDI markets reached nearly \$131 million in 1987, and will grow to nearly \$2 billion by 1993, for a 56% AAGR.

However, the EDI market is substantially larger than these figures indicate, as illustrated in Exhibit II-6.

EXHIBIT II-6



- Users have reported considerable internal expenses to upgrade systems to support EDI. INPUT calls this upgrading “EDI-stimulated” development work. Although the result is not EDI, it is closely aligned with EDI, and may surpass EDI-specific expenses severalfold.
- Computer and communications equipment, now excluded from the market sizing, may be dedicated to EDI, or share EDI functionality with

related applications. INPUT's Federal Information Systems and Services Program sizes equipment dedicated to EDI in the federal market at \$80 million in 1988, growing to \$163 million by 1993.

- Many companies, particularly in transportation services, offer EDI as a customer service. These systems, developed internally or by professional service firms, are not included in the market sizing.
- Network/processing service firms and software companies often contract for their EDI product development. Such vendor-to-vendor contracts, for professional services or commercial systems integration work, are not in the market sizing.

Accordingly, when considering these aspects, the EDI market is probably three or more times as large as forecast here.

G

EDI Software Recommendations: The Professional Services Opportunity

Information Services (IS) managers are becoming more aware of EDI and are coming to recognize the increasing complexity the EDI decision can create. This complexity means it is often necessary to enhance or replace existing systems, or to install new application, to take advantage of EDI's speed and other improvements.

This dynamic creates additional opportunities for vendors in add-on sales and/or professional service contracts.

Professional services are needed to help integrate EDI with related user applications and to overcome internal politics, since optimally EDI should be implemented in several functional areas. Accordingly, vendors should develop these skills, or build alliances bringing these capabilities to bear on the market.

EDI software vendors should ease the integration of EDI with other applications and plan for integrated products that can be used throughout the corporation. These products may encompass electronic funds transfer, electronic forms processing, and others, to spread the benefit of EDI throughout the organization and the trading group.

Recommendations are summarized in Exhibit II-7.

EXHIBIT II-7

EDI SOFTWARE RECOMMENDATIONS

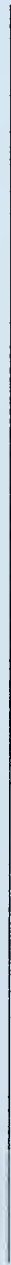
Integrate with Related Applications

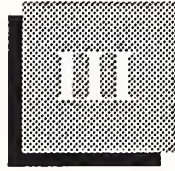
Address Multiple Functional Areas

Integrate with EFT, Electronic Forms, Others



An Electronic Data Interchange Tutorial





An Electronic Data Interchange Tutorial

This chapter provides background information on the development of EDI, describes the varieties of EDI, and describes the functions of EDI software. Further, the chapter examines the relationship between EDI and related applications and describes the role of EDI standards.

A

Background

1. Before EDI

Most large and many smaller companies have installed computerized systems to support routine business operations.

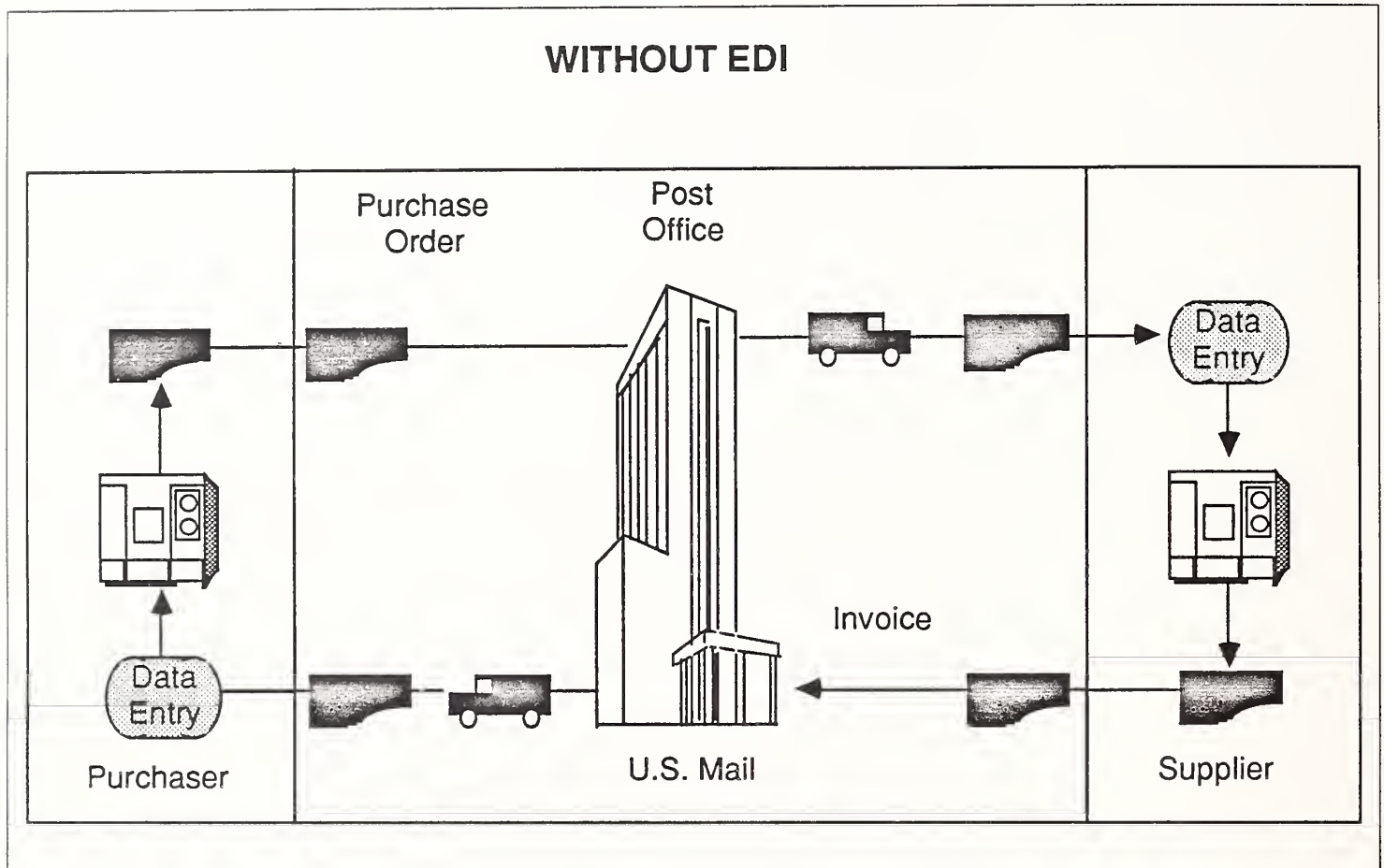
Typically, a business will use its computer applications to prepare business documents such as purchase orders, invoices, shipping instructions, and payment authorizations that are then printed and mailed to suppliers, customers, and banks. Alternately, the telephone may be used to take orders or relay information such as status reports and shipment tracing inquiries.

Exhibit III-1 shows the situation without EDI.

Many large companies use electronic means to transfer data to dependent suppliers, sometimes by physically shipping computer tapes or diskettes. Increasingly, communications networks are being used.

- Data transfers between dominant companies and their dependent suppliers often require the trading partner to accept whatever format the large company provides. This situation forces the supplier to accept a proprietary standard, with the penalty being the potential loss of business.
- This arrangement can place burdens on programming resources, especially when a supplier must comply with the requirements of many customers.

EXHIBIT III-1



2. Reasons for Using EDI

Computer-prepared information forms a data base that can be used in a variety of corporate management applications, including budgeting, accounting, forecasting, and government reports, and creates benefits for many corporate departments beyond the buying and selling functions. This avenue to optimization provides another reason for looking to the EDI solution.

The traditional ways of preparing and managing business documents have inherent problems:

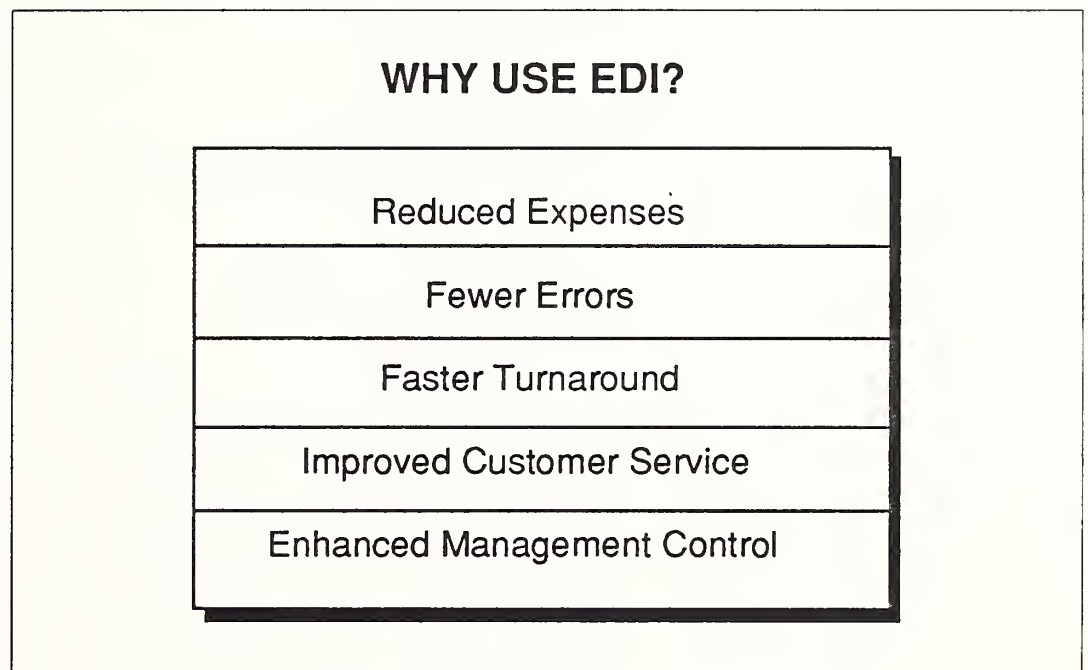
- Paper or verbal information is not directly usable by computers.
- Telephone ordering and order-taking are labor-intensive and error prone.
- Reliance on the mails slows turnaround time.

Many companies hold safety stock to meet unanticipated needs. Though it improves customer service, such safety stock can slow the turnover of assets, thus reducing profits.

EDI has been proven to save money. As discussed in Chapter IV, interviewed users who have compared their paper and electronic costs report that EDI transactions cost one-tenth of their equivalent paper documents.

The reasons for using EDI are summarized in Exhibit III-2.

EXHIBIT III-2



There are also other factors calling for the EDI alternative, including:

- Increasing appreciation that information management can be a competitive tool
- Awareness that new technologies can be used both economically and profitably
- Requirements for increased productivity and reduced storage, transportation, and administration costs

3. Problems of Direct EDI

A company's computer system can directly link to another company's. However, there are some basic problems with this direct, one-to-one solution:

- The computers may not be compatible.

- Information may be formatted in different ways.
- Direct links can be inefficient and costly, with scheduling, contention, and other network management problems.

Adding to these problems are complex business relationships. Companies do business with multiple business associates, often across industry segments.

These problems are illustrated in Exhibits III-3 and III-4.

EXHIBIT III-3

COMPLEX BUSINESS RELATIONSHIPS

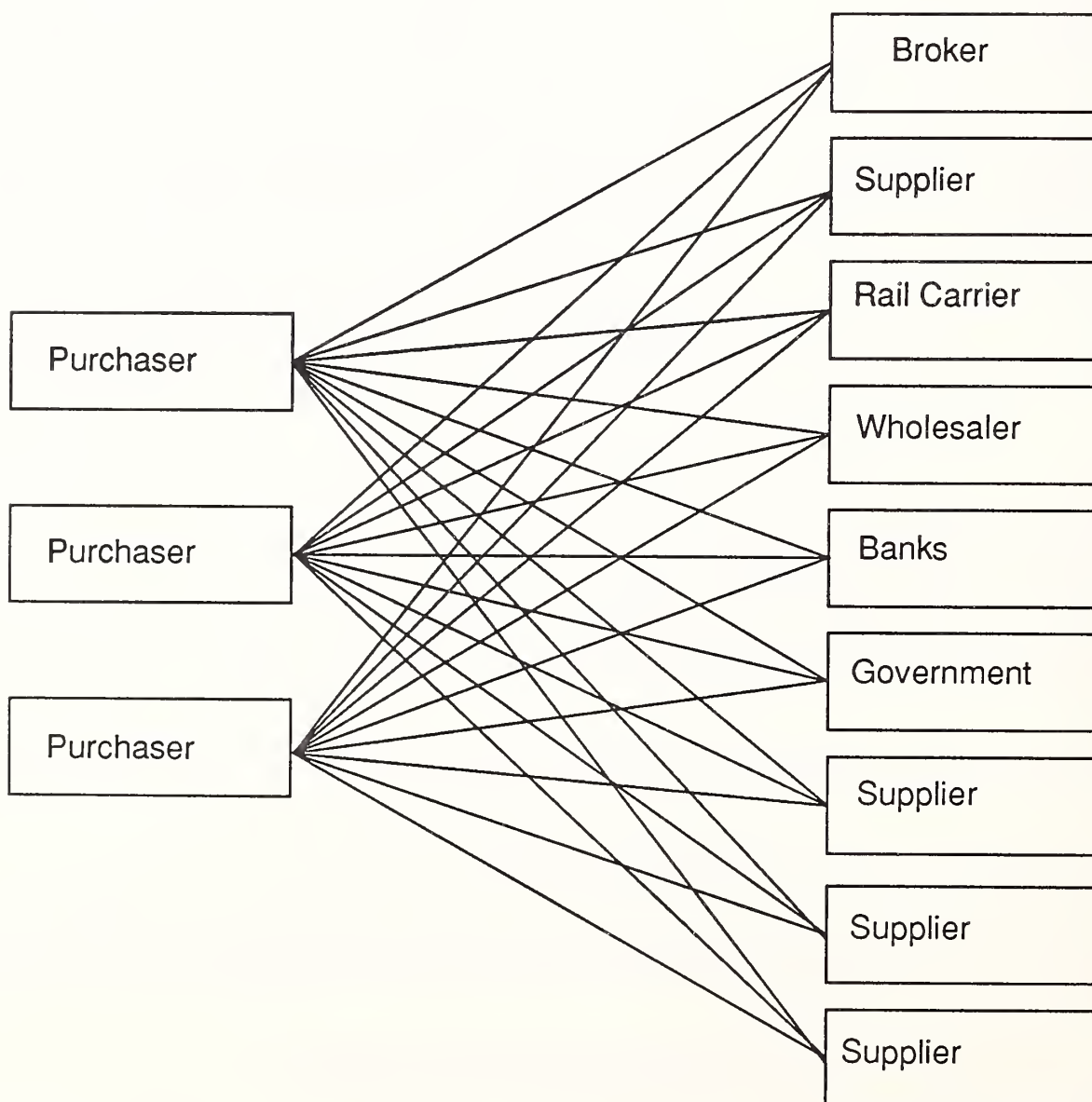
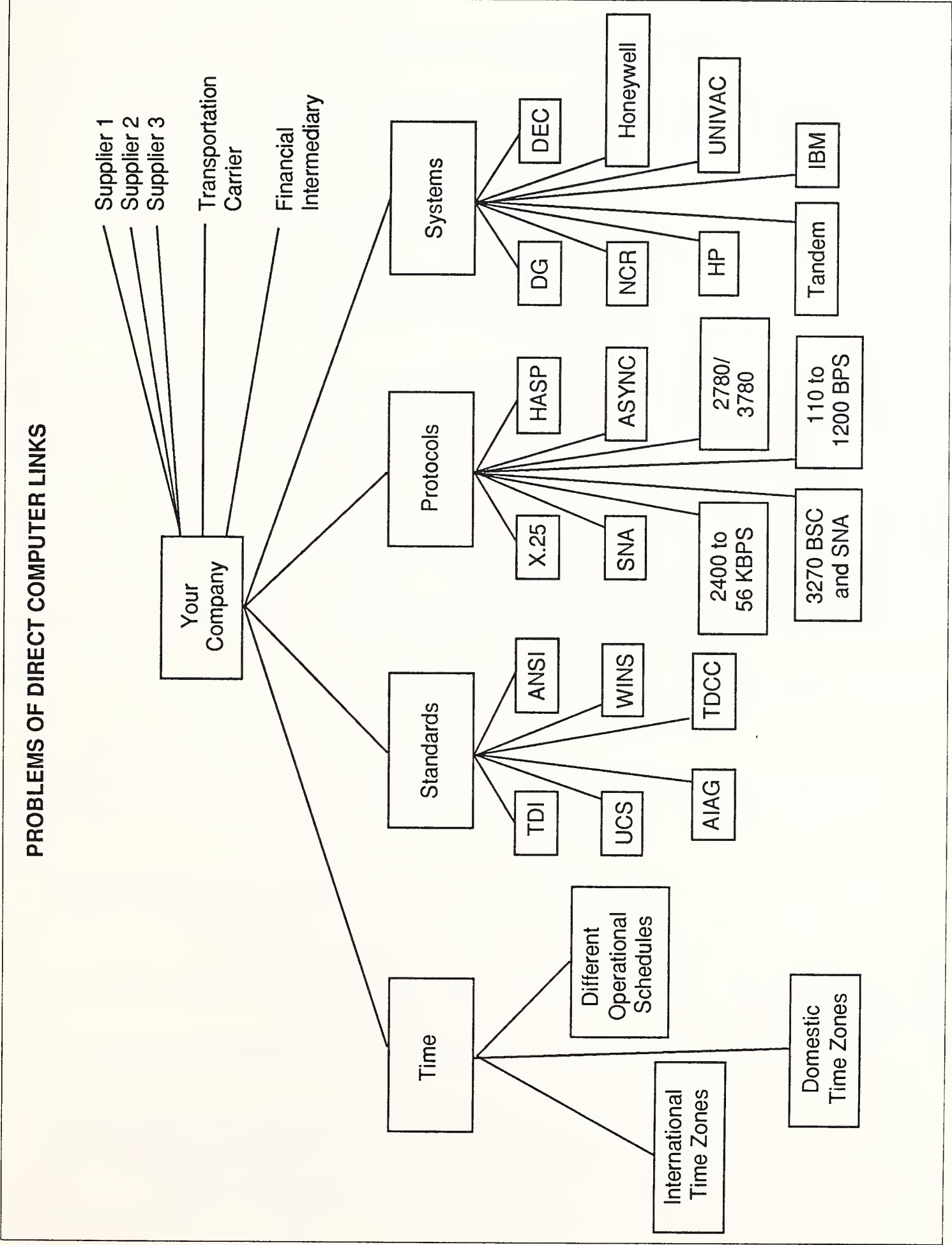


EXHIBIT III-4



4. Three Approaches to EDI

EDI works to overcome many of these problems by providing standards for direct or indirect linkages between corporate computers.

Several alternatives are available:

- A company may implement a private EDI network system.
- Third parties, such as a value-added network (VAN) or a remote computer service bureau (RCS), can provide mailbox store-and-forward service. They may also provide conversion services for different formats or communications protocols.
- A third alternative is an industry association network. Transnet (automotive parts), IVANS (insurance), and Specification 2000 (aircraft parts and services) are examples of this approach. These are described in INPUT's *North American EDI Service Provider Profiles* report.

B

Software Solutions

Users subscribing to VAN or RCS services may rely on software hosted on the vendor's processors to perform format conversions, or may internally convert private or application-specific formats to industry standard formats prior to transmission. The latter approach is less expensive over time and is the dominant trend.

Users can write their own EDI software or purchase it.

- If software is purchased, customization and interfacing to internal applications is usually required. This may be done by the software vendor, a professional services vendor, consultants, or the user's own development staff.
- EDI software should be closely linked to existing applications for management reporting and other functions to optimize its usefulness.

C

Relationship between Electronic Mail (E-Mail) and EDI

E-mail is defined as person-to-person communications, usually in text. It can be computer based, facsimile, or telex.

EDI is application-to-application communications, in machine-readable form.

Though E-mail can be used to transfer machine-readable binary files, such as spreadsheet data, INPUT does not consider this usage as EDI since the transfer is not in a public or de facto standard.

Like routine paper-based mail, E-mail is used for transferring business documents.

E-mail and EDI do complement each other. For example, E-mail is often used to negotiate purchases prior to the EDI exchange.

E-mail can be used for EDI-like applications with form creation options supporting order entry, inquiries, and other documents. However, these documents are not in machine-readable form. These forms systems can serve as low-volume EDI-like networks ("Poor Man's EDI"). They provide users with a starting point for EDI, and as volume grows, create a migration path for both users and E-mail service providers.

D

Relationship between EDI and On-Line Order Entry Systems

On-line order entry systems automate a company's internal sales or order-taking functions. Such systems enable telemarketing personnel to query the corporate data base regarding product availability, shipping status, special discounts, and so forth, as well as to enter orders.

Companies are opening existing on-line entry systems to their customers, but unlike EDI, these systems are typically terminal-to-computer applications rather than computer-to-computer applications. Open order entry systems shift the burden of data entry from supplier to customer, which issues purchase orders directly to the supplier's order entry system via a terminal that is often provided by the supplier.

- Although a personal computer may be used by the customer or supplier to access the trading partner's computer, it is often used in a terminal emulation mode.
- Some suppliers provide software to facilitate this activity, but more often than not, this software is limited to accessing the supplier's system.

INPUT views this type of system as an intermediate step to true EDI.

The relationship of EDI to E-Mail and on-line order entry systems is shown in Exhibit III-5.

EXHIBIT III-5

COMPARING THREE SYSTEMS

	EDI	E-MAIL	ON-LINE ORDER ENTRY
Communications Characteristics	Computer to Computer between Applications	Person to Person	Terminal to Computer
Documents	Purchase Orders, Invoices, Bills of Lading, Shipping Notices, etc.	Textual Messages	Orders and Inquiries
Public Standards	ANSI X12	CCITT X.400	Typically Terminal Emulation and TTY
Providers	Third Parties-to- Trading Clusters for Intra- and Inter- Industry Use: Corporate IS-to- Trading Partners (Large Companies)	Third Parties (Intercompany): Corporate IS (Intracorporate)	IS and Marketing Departments

E**Relationship between
EDI and Electronic
Funds Transfer**

Buying and selling relationships involve inquiring, ordering, bidding, shipping, and similar activities. The process culminates with a financial exchange.

While EDI is the transfer of *information* regarding the first set of functions, Electronic Funds Transfer (EFT) is the transfer of monetary *value*.

Financial institutions have several mechanisms for transferring monetary values. One of these methods (called Cash Trade Exchange, or CTX) has

been standardized to integrate payment information with the dominant ANSI X12 EDI standard.

There are several mechanisms for EDI/EFT functions being examined, as well as experimentation with private standards for payment transfer. Of note is General Motors, which has signed with a group of several banks that will issue payments directly to GM suppliers, thus bypassing NACHA clearinghouses.

Several third-party service providers already have, or are adding, financial capabilities to their EDI offerings. This capability enhances the value of EDI transactions and brings the buy/sell relationship full cycle with payment services. This area is just being explored by banks and their customers.

F

Relationship between EDI and Logistics

Logistics information refers to the location of materials in transit to or through the manufacturing and distribution process. Three third-party services provide logistics information to shippers to help plan and optimize their production schedules: Railinc, Kleinschmidt, and McDonnell Douglas. Several transportation carriers also provide this variety of EDI on a customer service basis.

Logistics information is usually provided as railroad car location messages (CLMs) and shipper's administrative messages (SAMs) for several modes of transportation. Optimally, this form of EDI, known as logistics data interchange (LDI) links into just-in-time (JIT) inventory management, material resource planning, (MRP II) and similar applications.

INPUT calls purchasing, EFT/EDI, and logistics EDI "Mainline" EDI.

G

Relationships between EDI, JIT, and MRP

Just-In-Time (JIT) is a factory management concept that seeks to keep inventory levels to a minimum.

In a JIT environment, production is order-driven; only enough finished product is kept on hand to meet the needs of actual orders received.

The JIT system is linked to the outside world by the order entry system. An attached EDI module serves to speed purchase order processing by improving the interface between customer data and internal applications.

On the supplier side of a manufacturing facility, a materials management system assures that only enough parts and materials are purchased to produce the specific number of finished products already ordered.

Materials Requirements Planning (MRP) is linked to the outside world via the purchasing department. The EDI purchase order becomes the key document in such a system.

An MRP II system (Manufacturing Resource Planning) is a broader concept than MRP. With MRP II, factory-based management systems are linked to other corporate systems, such as shipping, accounting, or financial planning.

There is an opportunity to introduce an EDI module wherever these systems interface with other trading partners. These modules could be related to the exchange of shipping notices, invoices, or other electronic documents.

H

Relationships between EDI, Data Bases, and Internal Applications

A corporation's business creates records stored in corporate data bases that preserve a record of transactions.

EDI creates corporate data base entries from incoming messages, and items retrieved from the data base are often used to issue outgoing messages.

There are several data bases within a typical corporation that are likely to interface with EDI. Within these systems, certain applications lend themselves to integration with EDI software, such as factory management systems, order processing systems, and accounts payable/receivable systems.

I

"Other" Forms of EDI

In addition to purchasing-oriented uses, EDI is also being used in health care, property, and casualty insurance applications. Other variants are also being explored.

1. Electronic Medical Claims Submissions (EMCS)

EMCS is definitionally the same as EDI. It consists of business data (in this case insurance claims and associated documentation) telecommunicated in a standard format (UB 82 and HCFA 1500) between entities (health care providers and insurance companies). The software functions to translate the data into standard formats and to handle the communications session.

Several companies provide EMCS network services. There are software packages, often embedded into medical computer systems, supporting EMCS formatting and communications.

2. Insurance Interface

EDI in the insurance industry is called Interface. The best known networking example is that provided by the Insurance Value-Added Network Service (IVANS) over IBM's Information Network.

Here, to batch insurance interface (as opposed to interactive interface) fits the definition of EDI. Business data, representing requests for price quotes, claims, etc., is translated into standard electronic formats and communicated between business partners (insurance agents and the underwriting companies).

Several insurance companies have their own captive systems.

The formats used for Insurance Interface are called IIR/ACORD. This acronym stands for Insurance Institute for Research and the Agent Company Organization for Research and Development. These two industry groups developed electronic and paper document formats and have merged into one entity.

Exhibit III-6 compares "Mainline" EDI, Electronic Medical Claims Submissions, and Insurance Interface.

EXHIBIT III-6

VARIETIES OF EDI

	"MAINLINE" EDI	EMCS	INTERFACE
Transactions	Purchase Orders, Invoices, Car Location Messages, EDI/EFT, etc.	Medical Claims	Policies, RFQs, Claims
Dominant Public Formats	X12, UCS, TDCC, NITL, CTX	HCFA 1500, UB 82	IIR/ACORD
Trading Partners	Buyers and Suppliers Shippers and Carriers Banks	Hospitals, Physicians' Services, and Insurance Carriers	Insurance Agents and Carriers
Third-Party Services	Most VANs, Many RCS Firms, Some Banks	GEIS, NEIC, and Regional Processors	IVANS, Western Union

INPUT will examine these “other” varieties of EDI at a later time.

J

Evolution and Functions of EDI Software

The original source of EDI software was the Transportation Data Coordinating Committee (TDCC), an industry association. The TDCC is changing its name to the EDI Association. EDIA/TDCC offers source code to in-house programmers, consultants, and commercial product developers for a variety of purposes.

EDI software was first developed by communications software engineers who designed translators to convert data between two or more structured formats. This software is now being refined and integrated into a variety of applications.

In general, transaction-oriented software has become increasingly sophisticated.

1. Categories of EDI Software Providers

There are three main categories of EDI software providers:

- Start-up companies, which focus on generic translators. Some of these firms started as generalized software/systems consultancies and have started new EDI software units.
- Value-added networks (VANs) and remote computing services (RCS), whose primary goal is to increase revenues from EDI transactions through their services.
- Established business and manufacturing applications vendors that have added EDI capabilities to existing products.

While network and service providers and application developers tend to design products that integrate easily into their own networks or applications, some are marketing generic translators that compete with products from the first group.

The categories of EDI software providers are shown on Exhibit III-7.

EXHIBIT III-7

SOFTWARE VENDOR CATEGORIES

CATEGORY	COMMENTS
Start-Ups	Entrepreneurial, Some Spin-Offs of Consulting Firms
VAN/RCS	Goal Is to Increase Network Traffic
Established Application Vendors	Adding EDI Functions to Existing Software

2. The EDI Translation Process

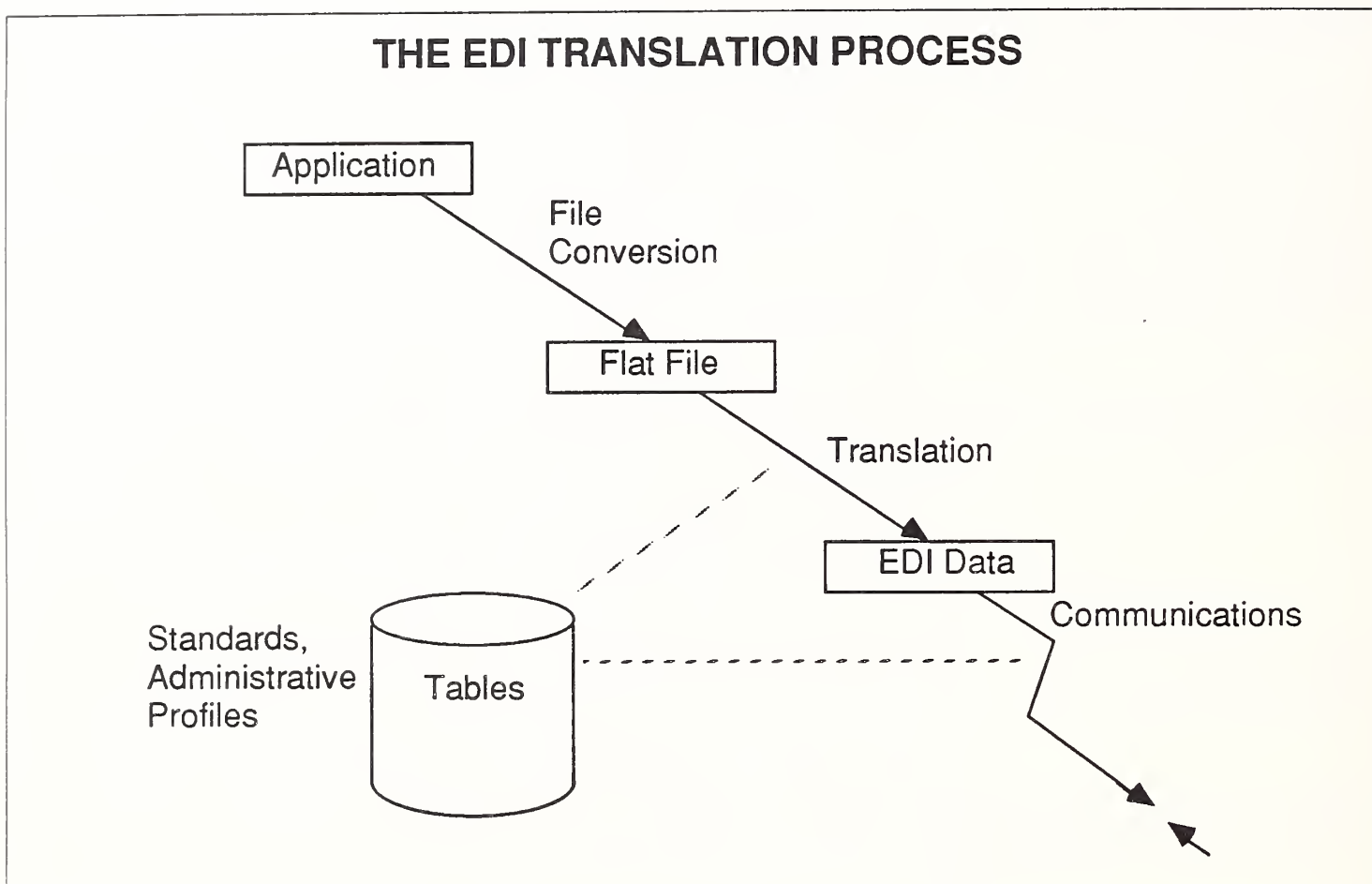
EDI software is only one element of an EDI system. Essential to EDI software is a translation function between generic flat-file outputs to public or industry-specific standards, or between those standards.

Conversion of applications-related data into EDI data proceeds as follows:

- File conversion software converts data from an application program (such as a purchasing system) into a fixed-length set of records contained in a flat file.
- The flat file is read into the translator, where it is converted into the desired EDI format.
- The converted data is then transported under the control of the communications software, which handles network management, including speed, protocol, error checking/correction, and dialing options.
- The communications software handles the session on the receiver's side, with a file conversion function handing off data to the translator for reformatting into a structure acceptable by the recipient's application.
- Within the recipient's environment, the EDI data is parsed out into the appropriate applications.

Exhibit III-8 is a schematic illustrating this process.

EXHIBIT III-8



Assuming increasing importance in EDI software functionality is an administrative module that maintains trading partner profiles. These profiles describe each partner in terms of standards used, communications methods supported, electronic “addresses,” and frequently used information, such as the preferred shipping method, and identifiers such as DUNS numbers.

Additionally, the administrative function may contain system “intelligence,” such as the quantities and products usually ordered by specific customers, with provisions for sounding an alarm should those parameters be exceeded. This function adds a level of error detection to information that may comply with the standards but be in error from a business sense.

3. Translators Are Table Driven

EDI software is generally table driven, allowing for easy updates and maintenance.

- A table is an organized collection of data items. Each data item in a table is referenced by its position relative to all other items.
- A table may be a simple list of items. A table with both rows and columns is a two-dimensional table (often called a “flat file”). In actual practice, a table may have many more “dimensions,” determined by what the specific programming language permits.
- However, a general rule for a table is that each data item must have identical “characteristics” with every other item. For example, if the table contains numeric data, each data item must be limited to a maximum number of digits and have the radix point (separating the integral and fractional parts of a number) in the same relative position.

Tables are frequently used in programs as a convenient way of storing and accessing data. An internal table is stored (“hard-coded”) within a program, while an external table is stored outside the program.

- The use of tables, sometimes called arrays, is known as parametric programming because the data items within these files and tables act as arguments (parameters) and are accessed by the program when needed.
- A primary advantage in parametric programming is the relative ease with which the program can be maintained.
- It is not necessary to revise a program when the values of these “parameters” change. It is usually much simpler just to change values in the file or table.

4. The Tables Define Transaction Sets (Electronic Documents)

Transaction sets define data formats representing electronic equivalents of business documents. These transaction sets originated in industry-specific fixed formats, such as those developed for the automobile industry.

In the mid-1970s standards committees began to form more flexible standards, allowing users to use standard generic transactions, such as purchase orders, or if desired, a customized transaction that could be easily translated and transmitted to a user of any other format.

The most important EDI standards organization is the ANSI X12 Committee, which defines the “generic” and dominant EDI standards.

X12 transaction sets can have variable-length fields, which are 40% -70% more efficient than fixed-length fields, resulting in significantly lower communications costs.

Exhibit III-9 lists several commonly used EDI transaction sets.

EXHIBIT III-9

EDI TRANSACTION SETS

110 TDCC - Air Invoice
203 TDCC - Bill of Lading
210 TDCC - Motor Freight Bill
214 TDCC - Shipment Status Message
404 TDCC - Shipment Information (Rail)
410 TDCC - Rail Freight Bill
810 ANSI - Invoice
820 ANSI - Payment/Remittance Advice
830 ANSI - Material Release
832 ANSI - Price/Sales Catalog
840 ANSI - Request for Quote
843 ANSI - Response for Request for Quote
850 ANSI - Purchase Order
855 ANSI - Purchase Order Acknowledgement
856 ANSI - Advance Ship Notice
860 ANSI - Purchase Order Change Request
861 ANSI - Receiving Advice
862 ANSI - Shipping Schedule
865 ANSI - Purchase Order Change Acknowledgement
870 ANSI - Order Status Report
875 UCS - Purchase Order
876 UCS - Purchase Order Change
877 UCS - Purchase Order Adjustment
880 UCS - Invoice
882 UCS - Statement
884 UCS - Shipment Advice
888 UCS - Item Maintenance
889 UCS - Promotion Announcement
890 UCS - Prepayment Adjustment Advice
891 UCS - Promotion Announ Change
905 UCS - Remittance Advice
940 WINS - Warehouse Shipping Order
941 WINS - Warehouse Inventory Stats
942 WINS - Warehouse Activity Report
943 WINS - STK Transfer Shipment Advice
944 WINS - STK Transer Receipt Advice
945 WINS - Warehouse Shipping Advice
980 TDCC - Functional Group Totals
994 UCS - Administrative Message
997 ANSI - Functional Acknowledgement
999 TDCC - Acceptance/Rejection Advice

Exhibits III-10 and III-11 show how EDI data represents a paper document.

EXHIBIT III-10

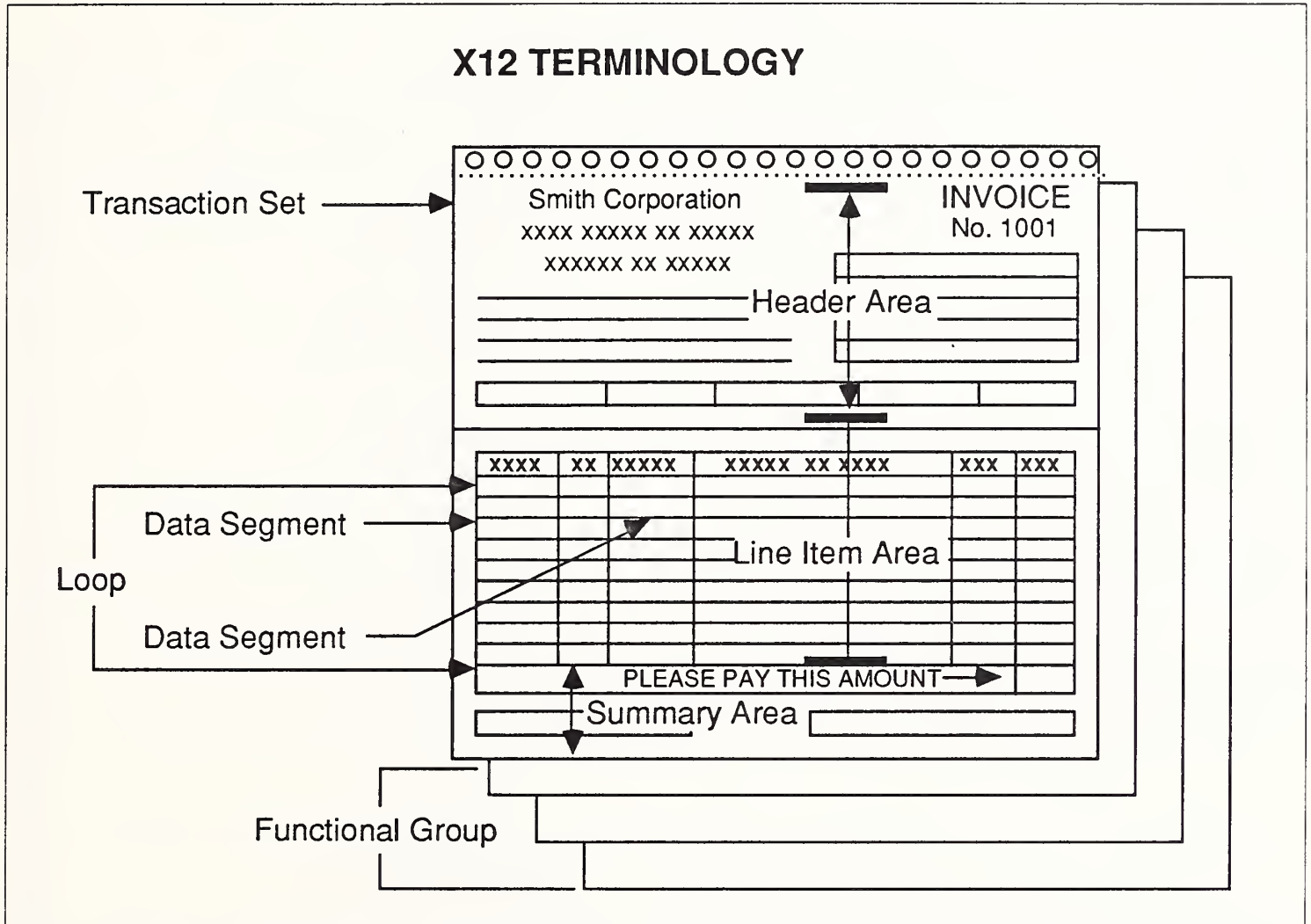


EXHIBIT III-11

EDI FORMAT VERSUS PAPER FORMAT (INVOICE)

ST*810*0001 N/L		TRANSACTION SET HEADER				
BIG*810713*1001*810625*P989320 N/L		Date 7/13/81 Order Date 6/25/81		Invoice No. - 1001 Cust. Order No. - P989320		
LS*100 N/L		LOOP HEADER				
N1*BT*ACME DISTRIBUTING COMPANY N/L N3* P.O. BOX 33327 N/L N4* ANYTOWN*NJ*44509 N/L		CHARGE TO ACME Distributing Company P.O. Box 33327 Anytown, NJ 44509				
N1*ST*THE CORNER STORE N/L N3* ^)! FIRST STREET N/L N4*CROSSROADS*MI*48106 N/L		SHIP TO The Corner Store 601 First Street Crossroads, MI 48106				
N1*SE*SMITH*CORPORATION N/L N3*900 EASY STREET N/L 48BIG CITY*NJ*15455 N/L		REMIT TO Smith Corporation 900 Easy Street Big City, NJ 15455				
LE*100 N/L		LOOP TRAILER				
IT9*01*03*2**10 N/L		TERMS OF SALE. . . 2% 10 days				
PER*DU*C.D. JONES*TE618/555-8230 N/L		CORRESPONDENCE TO C.D. Jones 618/555-8230				
LS*200 N/L		LOOP HEADER				
		QUANTITY	UNIT	NO.	DESCRIPTION	PRICE
IT1*3*CA*127500*VC*6900 N/L		3	Cse	6900	Cellulose Sponges	12.75
IT1*12*EA*4750*VC*P450 N/L		12	Ea	P450	Plastic Pails	4.75
IT1*4*EA*9400*VC*1640Y N/L		4	Ea	1640Y	Yellow Dish Drainer	.94
IT1*1*DZ*34000*VC*1507 N/L		1	Dz	1507	6" Plastic Flower Pots	3.40
LE*200 N/L		LOOP TRAILER				
CAD*N****CONSOLIDATED N/L		Via Consolidated Truck				
TDS*5111 N/L		INVOICE TOTAL PLEASE PAY THIS AMOUNT \$51.11				
SE*24 N/L		TRANSACTION SET TRAILER				

5. EDI Translators Usually Include Document Processing

Most translator packages also have an associated document processor, the editor that allows data entry and document printing.

- Some software supports a limited number of document types. For example, one software package may only support a specific industry's purchase orders and invoices, while others support generic purchase orders, invoices, and other documents. Some software packages will optionally support the creation of customized documents, using the standardized translation tables. Most vendors sell a limited set of documents at the base price, but offer additional transaction sets at an additional fee.

6. EDI Software May Be Integrated with Communications

While INPUT defines EDI software as essentially a translator, most products do include a communications module. This module may be sublicensed from a company other than the primary vendor.

In addition to supporting dial-up communications, some network service providers have written their software to connect automatically into their network.

Several PC EDI software vendors offer bisynchronous 2780/3780 terminal emulation boards and software for users needing to communicate higher volumes of data. This option usually adds about \$1,500 to the base price.

With the exception of software designed for use in the grocery industry, the communications software offered with EDI packages is not specifically defined by EDI standards, but rather conforms to general communications standards. The grocery industry EDI standard, Uniform Communications System (UCS), is, to date, the only EDI standard specifying a communications method.

EDI software functions are summarized in Exhibit III-12.

EXHIBIT III-12

EDI SOFTWARE FUNCTIONS

Table-Driven Translation

Transaction Sets—Electronic Document Formats

Document Processor—Editor and Output

Administration Function

Optional Communications Module

7. Not All Communications Software Is EDI Software

Some developers of communications software products are positioning their data communications products as EDI software. The store-and-forward capability of some packages could be used to implement a private mailboxing system to bypass third-party service providers. These products fall outside INPUT's definition of EDI software if they have no translation capability.

8. Not All Translators Are EDI

EDI translators are designed for intercompany communications of business data in structured formats. Another class of utility software, also called a translator, is used to translate from one computer or application to another within the same company.

K**Standards and EDI Software****1. ANSI X12, TDCC, and Industry-Specific Standards**

American National Standards Institute's X12 standards have been adopted by several industry groups. These groups have often placed subtle variations on the basic standard to adapt it to the industry's unique needs. These variations take into account various measurements, special billing requirements, and/or shipping instructions.

- Examples of these subsets of X12 are standards for the automotive (AIAG), chemical (CIDX), electronics (EDX), office products (ICOPS), retailing (VICS), and Telecommunications (TCIF) industries.

- The TDCC family of standards primarily relate to transportation (e.g., ocean, air, rail, and motor), but are similar to those used in the grocery (UCS) and warehousing (WINS) industries.

These standards are maintained by “secretariats,” agencies and organizations appointed to these functions. For example, ANSI’s X12 is maintained by the Data Interchange Standards Association (DISA). UCS, WINS, and VICS are maintained by the Uniform Communications Council (UCC), and the TDCC family is maintained by the Transportation Data Coordinating Council, now called the EDI Association. There is increasing coordination and cooperation between these groups.

Certain industries maintain industry-specific standards. In the case of drug wholesaling, the standard is called either NWDA (for National Wholesale Druggists Association) or Ordernet for the vendor that actually did the development work. There are also formats used in aircraft maintenance (Spec 2000) and automotive parts (Transnet).

Health care insurance claims submissions use standards established by an agency of the U.S. government, and Insurance Interface formats were established by an industry association.

Furthermore, so-called “private” EDI standards have been established by dominant companies in several industries that may, but more often do not, have elements in common with the other standards. These formats carry the name of the company authoring them: GM, Ford, Chrysler, or K-Mart, among others.

2. International Standards

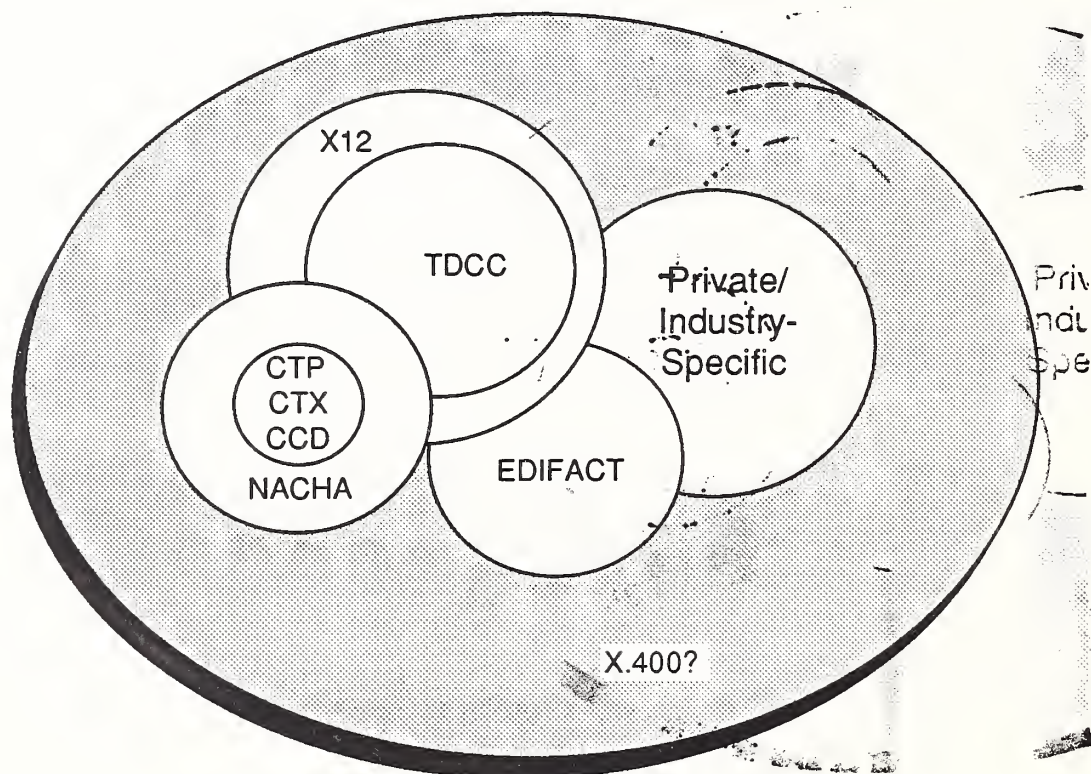
International standards have been called GTDI, and are now called EDIFACT. General Trade Document Interchange (GTDI) evolved from the United Kingdom’s trade facilitation agency called SITPRO (Simplification of International Trade Procedures), which lobbied for United Nations acceptance of the earlier Trade Document Interchange (TDI) standard.

Work is progressing toward developing the EDIFACT standards for use in international business transactions, and the ANSI X12 committee is studying ways to migrate from X12 to EDIFACT. The first approved EDIFACT transaction sets are now available, and the EDIFACT syntax has been approved by the International Standards Organization (ISO). U.S. participation in EDIFACT development appears to be falling under the X12 secretariat’s administrative umbrella.

Exhibit III-13 shows these standards and their relationships, with the intersections implying a degree of compatibility.

EXHIBIT III-13

EDI STANDARDS RELATIONSHIPS



- The standards in the NACHA grouping refer to National Automated Clearinghouse Association standards for Electronic Funds Transfer (EFT).
 - Cash Concentration and Disbursement (CCD) and Corporate Trade Payment (CTP) are used to exchange value (rather than information) in a transaction between trading partners through the banking system.
 - The CTX format is closest to X12, since it can carry information about a payment, as well as the payment itself.

The overshadowing X.400 standard shown in the exhibit represents the evolving E-Mail standard that may eventually envelop all currently used EDI standards. The latest proposed enhancements to X.400 (called X.400/88) contain features such as broadcast messages, which directly address EDI functionality.

Exhibit III-14 provides the names and addresses of many agencies involved in setting EDI standards.

EXHIBIT III-14

AGENCIES AND ASSOCIATIONS INVOLVED IN EDI STANDARDS (Partial Listing)

American National Standards Institute
1430 Broadway
New York, NY 10018
(212) 354-3300

American Paper Institute
260 Madison Avenue
New York, NY 10016
(212) 340-0600

American Trucking Association
2200 Mill Road
Alexandria, VA 22314
(703) 838-1926

Association of American Railroads
50 F Street NW
Washington, DC 20001
(202) 639-2325

Automotive Industry Action Group
North Park Plaza Suite 830
17117 West Nine Mile Road
Southfield, MI 48075
(313) 569-6262

Data Interchange Standards Assoc.
1800 Diagonal Road
Alexandria, VA 22314
(703) 548-7005

EDI Association/Transportation
Data Coordinating Committee
1101 17th Street, NW
Washington, DC 20036-4775
(202) 293-5514

EDI Council of Canada
5401 Eglinton Avenue West
Suite 103
Etobicoke, Ontario M9C 5K6
(416) 621-7160

Graphics Communications and
Computers Association
1730 North Lynn Street
Suite 604
Arlington, VA 22209
(703) 841-8160

Health Industry Business
Communications Council
5110 N. 40th Street, Suite 120
Phoenix, AZ 85018
(602) 381-1091

Continued

EXHIBIT III-14 Cont.

AGENCIES AND ASSOCIATIONS INVOLVED IN EDI STANDARDS (Partial Listing)

National Association of
Refrigerated Warehouses
7315 Wisconsin Avenue
Bethesda, MD 20814

National Trade Facilitation Council/
National Commission on International
Trade Documentation
350 Broadway Suite 205
New York, NY 10013
(212) 925-1400

National Office Products Association
3166 Des Plaines Avenue Suite 223
Des Plaines, IL 60018
(312) 297-6882

Paper Trade Association
420 Lexington Avenue
New York, NY 10017
(212) 682-2570

Telecommunications Industry Forum
c/o Exchange Carriers Standards
Association
5430 Grosvenor Lane Suite 200
Bethesda, MD 20814-2122
(301) 564-4505

Technical Association of the Pulp
and Paper Industry
One Durwoody Park
Atlanta, GA 30338
(404) 446-1400

Steel Service Center Institute
1600 Terminal Tower
Cleveland, OH 44113
(216) 694-3630

Uniform Code Council
8163 Old Yankee Road
Suite J
Dayton, OH 45459
(513) 435-3870

Chapter VI presents INPUT's forecasts on how EDI standards will evolve.

L

On-Network Translation

For the most part, translation between a company's internal formats and a public standard is best accomplished via a modular, add-on EDI software package. This situation will gradually change as new applications are installed with integrated EDI translation, or which create native files in EDI formats.

However, for translation between public formats (as opposed to between internal and public formats) on an occasional or low-volume basis, on-network translation may be more cost effective and/or convenient. As implied, on-network translation is a value-added service provided by a third party.

- Lesser-used formats would not need to be updated by the user organization; rather, the network would maintain them.
- On-network translation may be less expensive than buying a translator, given usage frequency and the number of trading partners requiring such translation.

From the network's viewpoint, supporting on-network translation means being able to install and maintain multiple sets of standards, perform compliance checking to ensure adherence to a given standard, and have billing systems that track translation services. This type of support adds cost, but also adds value and an image of "full service."

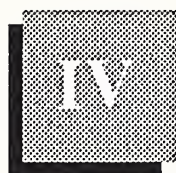
As the EDI market matures, and as acceptance of centralized standards grows, the need for on-network translation will likely diminish.

The next chapter examines users' needs and concerns relative to EDI software issues.



EDI User Needs and Concerns





User EDI Needs and Concerns

This chapter presents the results of INPUT's user interviews regarding EDI concerns relative to EDI in general, and EDI software in particular. It provides survey data regarding the desired EDI software features.

In another INPUT report, *Vertical Market EDI Potentials and Directions*, individual market sector activity is reported, with an analysis of unique industry needs and issues. User issues related specifically to EDI service providers are described in INPUT's study, *North American EDI Service Market Analysis*.

A

Overall EDI Issues and Concerns

EDI involves several issues including standards, control, and financial responsibilities, business practices, cost issues, and security. These concerns can influence market acceptance and the success of users' EDI implementations.

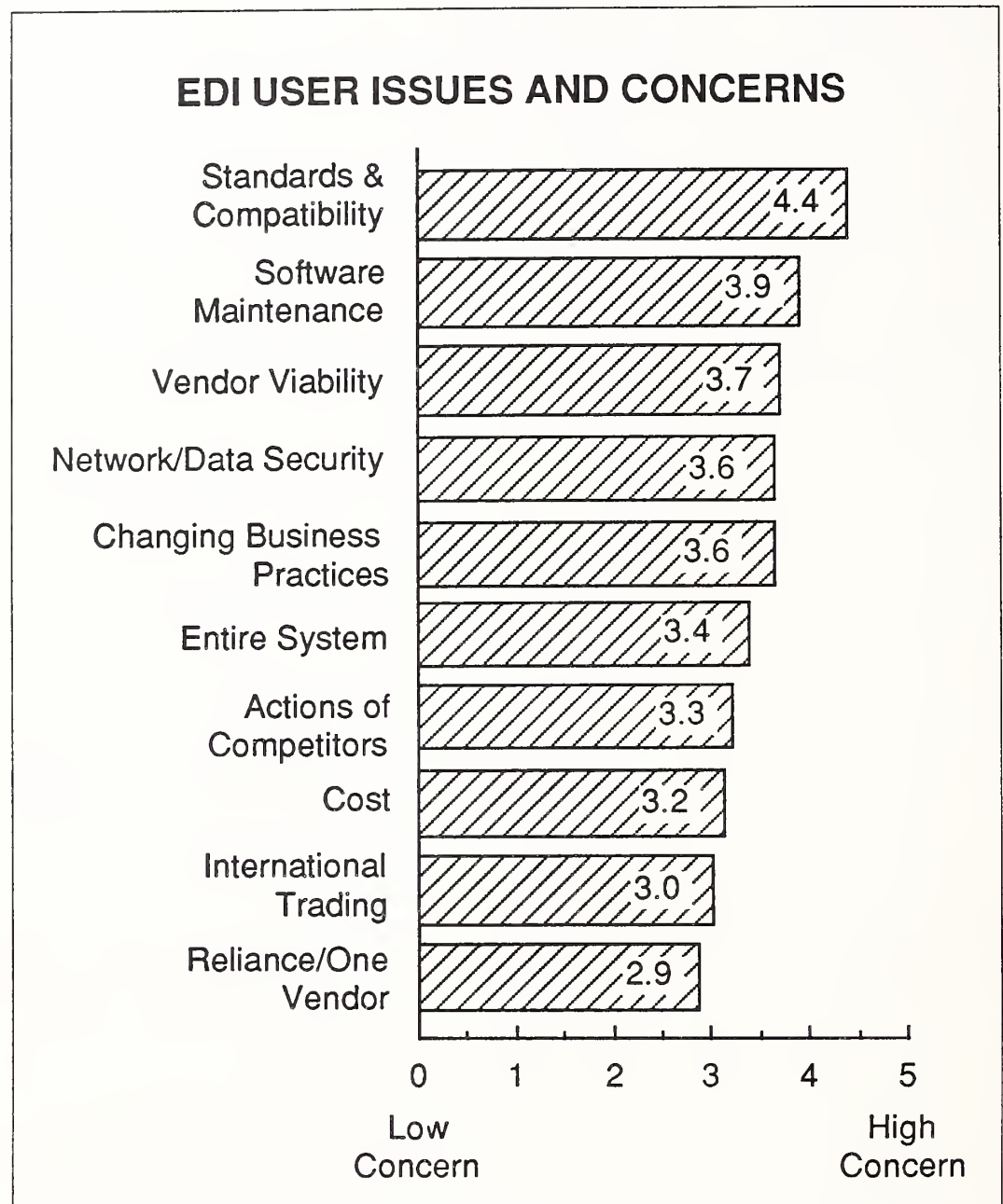
Exhibit IV-1 shows user's ratings of EDI concerns, which are discussed below.

1. EDI Standards and Compatibility

This year, standards and compatibility have replaced security as the primary user concern.

Users appear aware of pressure on proprietary and industry-specific formats to conform to public standards and are uncertain about the migration plan of X12 to the international EDIFACT standard. There is also uncertainty about the appropriate roles of various EDI standards-making organizations.

EXHIBIT IV-1



a. Software Maintenance Is Partially a Standards Issue

Software maintenance involves several aspects: upgrades, fixes, and maintaining standards.

EDI software typically adopts the latest standard version while supporting earlier releases for companies in transition.

b. Survey Findings

Users averaged their concerns on standards and compatibility at the highest rating (4.4 on a scale of 5), with many professing confusion about the status of standards.

INPUT believes that users are often dealing with partial information. Nevertheless, the perceived unsettled status of EDI standards is inhibiting the market, while the acceptance of cross-industry standards is having a countervailing effect, encouraging cross-industry trading and the overall growth of EDI.

- Users averaged their concerns on software maintenance at a slightly lower rating, with this issue rated second on the list of concerns.

While some users feel EDI standards are unstable, others acknowledge that software and standards maintenance are likely to be ongoing chores, but count on software vendors to provide updates.

The use of standards by major corporations, particularly those with cross-industry trading relationships, is having a major impact in turning previously “academic” standards into standards applied to real needs.

2. Security

a. Confidentiality Is Critical

Sensitivity to security has been heightened with the much publicized phenomena of computer viruses, which can take a benign form as a “peace message” or a Christmas Card. Far more destructive are “Trojan Horse” programs which can erase or scramble data and programs. The Iran-Contra affair, during which archived electronic mail files were widely publicized (files few realized were available after erasure), is another recent event heightening security awareness.

Information about a company, its customers, and its sales is generally held to be confidential and other companies are granted access to this information only to perform needed services in support of the trading function.

- Each company and third-party service provider is responsible for keeping its data from unauthorized parties.
- The data elements that may be transmitted to authorized parties are specified in EDI standards.

b. Survey Findings

Users interviewed by INPUT rated security relatively high 3.6 (on a scale of 5), but below standards-related issues and vendor viability.

Many companies are reluctant to talk about security concerns; however, at least one large potential user company has assigned its security chief to EDI security.

Some companies have higher security requirements than others. In certain industries, such as petroleum, individual transactions are large and errors can be particularly damaging, whether caused by misplaced decimals or delay.

Security concerns relate to a number of issues. In addition to potential leaks of competitive information, potential exposure in law suits is of concern to users.

- Companies don't want to be accused of having viewed or altered a competitive company's data.
- One user describing this concern noted that subpoenas have been issued for archived data and memos, data that could have been altered.

A common concern is the vulnerability of information passing through third parties.

- Users are reluctant to allow others access to their mainframes and many isolate them from networks.
- Using a microcomputer (or other processor) as an EDI front-end would appear to address the issue, and many users have taken this approach.
- Third-party EDI offers a layer of security, since trading partners do not directly access each other's computers.

There are also concerns that data be properly translated between formats and validated.

c. Encryption vs. Authentication

It is beyond the scope of this study to fully examine how security can be addressed through technological means. Briefly, two methods are used:

- Encryption "scrambles" data, requiring a key to reassemble data into its original form. This method has been difficult to manage, since an error will leave all data in the transaction unusable.
- Authentication uses a method that verifies that the contents of a message or transaction remain as they were originally and that the individual authorized to send the transmission did, in fact, do so.

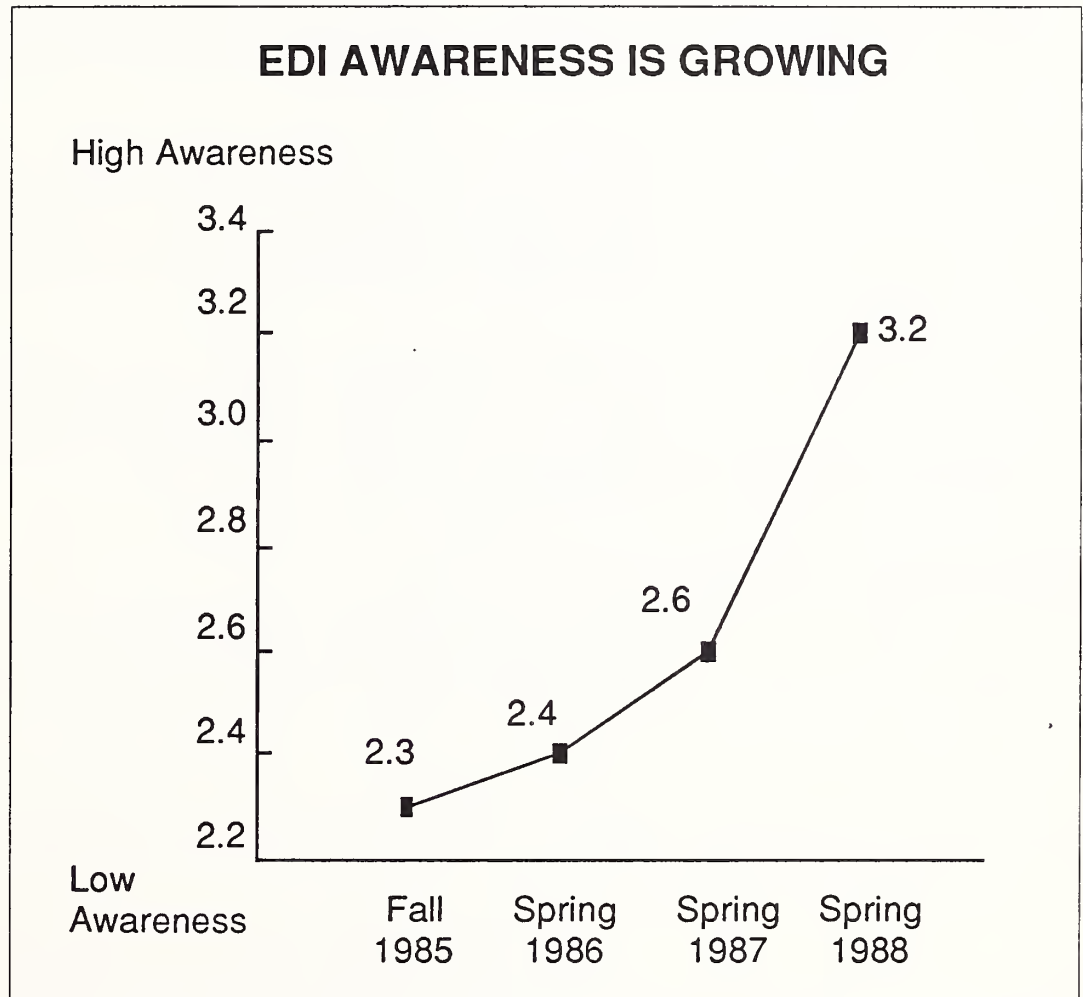
Users are concerned about internal breaches of security as well. A company maintaining parallel paper and electronic systems may fear an unscrupulous employee issuing duplicate transactions and, through collusion with a trading partner, gain from a redundant purchase order or other transaction.

3. Awareness

INPUT has tracked users' self-rated awareness quotients in several surveys since 1985. Exhibit IV-2 shows how this rating has changed, based on a survey of 200 IS managers.

As the exhibit shows, awareness of EDI is clearly increasing, with a substantial jump shown in the past 12 months.

EXHIBIT IV-2



More critical than IS awareness of EDI is upper management awareness, since EDI potentially impacts multiple departments within the corporate environment.

- In a study commissioned by the American Electronics Association, 44% of the senior managers and executives surveyed confessed not knowing anything about EDI, a finding that INPUT believes may be consistently applied to many other industries.
- Additional marketing and promotional efforts are needed, since EDI is a corporate, rather than an IS, issue.

4. Cost Savings

a. About Data Entry

The Data Entry Management Association reports that nearly 30% of an IS budget is derived from data entry, with 80% of data entry costs attributed to labor.

Technology is addressing this basic IS element with optical character recognition, voice data entry, and other methods. Regardless of methodology, most information needed for processing comes from documents.

In recent years, data entry functions have moved from a centralized, IS-based service to the end-user level. Among advantages of this decentralized approach are faster data input from source documents and fewer errors, since end users are more familiar with the data and more inclined to accurately enter the information needed in their functions.

With EDI, core data is entered once by the document originator and incremental information may be added as the transaction moves between companies and internal departments. The savings that can result are significant.

b. Survey Results

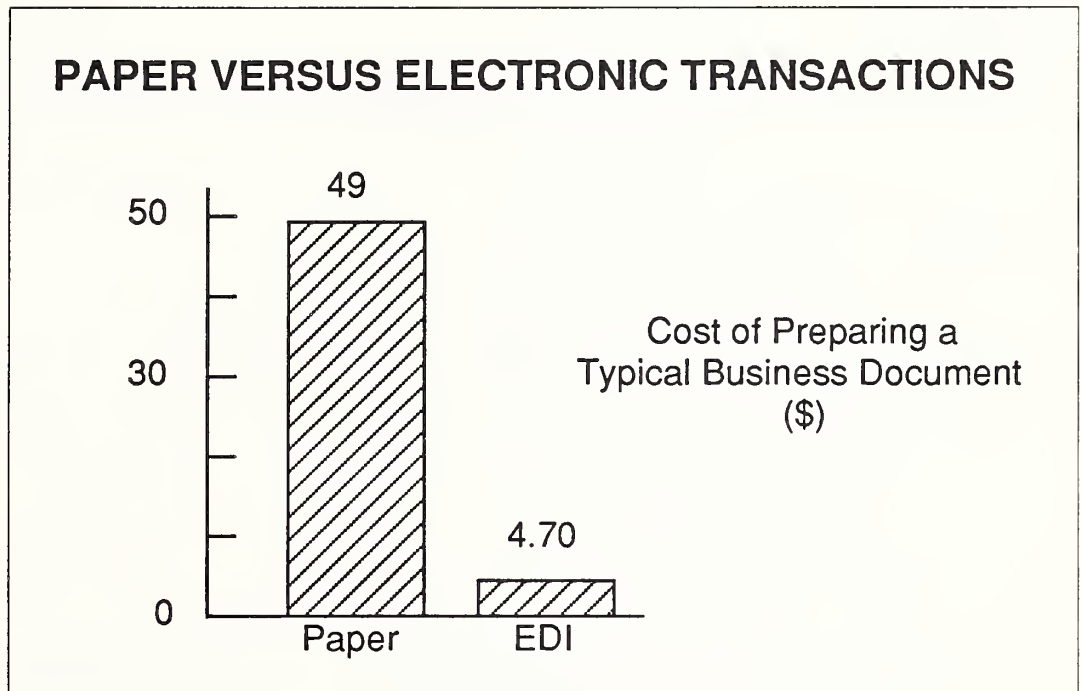
Interviewed users expect EDI to lead to substantial cost savings in their buying and selling relationships, but approximately half (53%) failed to examine their costs per paper-based transaction.

- INPUT has found that new technology cost justifications are often done on a soft dollar, qualitative basis rather than on a quantified basis.
- It is sometimes difficult to separate EDI from related systems, and many managers rely on intuition or the obvious when evaluating EDI's benefits. This method may inhibit market acceptance, as it permits objections to be raised for which there is little or no data available in response.

Those doing an analysis of their paper-based transaction costs said that on average, each paper-based transaction cost \$48.54, while each EDI transaction averaged \$4.70, or one-tenth the cost.

These findings are illustrated on Exhibit IV-3.

EXHIBIT IV-3



Other respondents reported savings in other terms:

- “We used to have five more people in the office to handle paperwork. We’ve saved \$100,000 in salaries.”
- “It used to take us four days to process the paperwork. Now it takes us less than an hour to process the same orders.”
- “We didn’t do it to save money. We did it as part of our competitive tactics.”

A few users reported no savings, one saying, “You don’t get any savings if you have only one or two customers using EDI.”

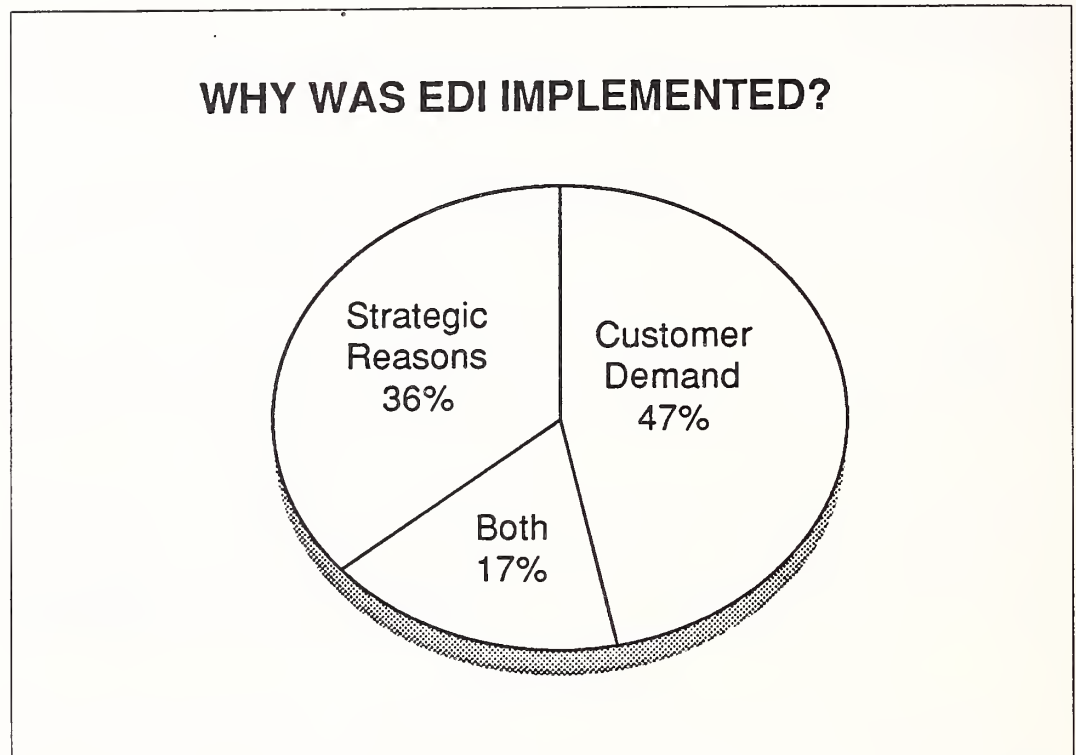
5. Implementation Issues

a. Reasons for Implementing

As shown in Exhibit IV-4, most current EDI users (47%) implemented the application in response to their customers, while 36% adopted EDI for their own reasons, with the balance (17%) cited both motivations.

Specific corporate reasons cited were: desires to reduce inventories and improve cost effectiveness, cementing relationships with suppliers, strategic advantage, and improved customer service.

EXHIBIT IV-4



b. Implementation Timeframes

EDI users indicate that the time needed to implement an EDI solution averaged almost six months. The individual experiences ranged from one month to several years, with one respondent reporting the EDI system “evolved” and is still “evolving.”

c. Who Implements EDI?

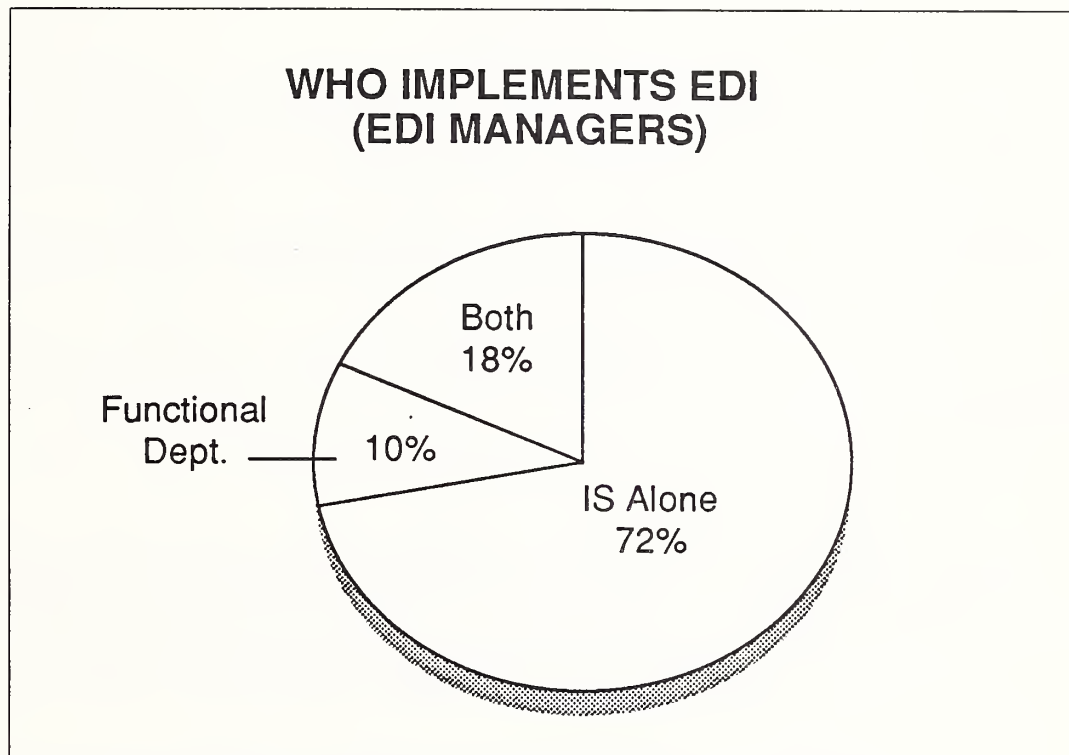
EDI managers interviewed by INPUT report that in most instances (90%), the IS department was solely or partially responsible for the EDI implementation. Since EDI is an application of computing and communications, this is to be expected.

However, IS did not necessarily go it alone. Eighteen percent of the respondents reported that IS and a functional department jointly managed EDI implementation. This partner may have been marketing, material planning, purchasing, or a combination of departments.

In 10% of the cases, the functional department managed EDI implementation alone.

These findings, shown in Exhibit IV-5, are expected to shift toward more joint implementation, with IS and functional departments sharing development responsibilities.

EXHIBIT IV-5



Many, if not all, software firms provide some level of professional services in training and education, software customization, systems integration, and project management to assist users developing EDI systems.

d. Implementation Assistance

Users were asked if they implemented their EDI system alone, or if they had help. Respondents were nearly evenly divided between those who implemented without outside help and those that had assistance.

Of those receiving external assistance, 82% reported receiving it from Value-Added Networks and 8% received assistance from industry associations. This finding is not surprising given that VANs offering EDI services have much to gain by assisting users.

6. EDI-Stimulated Development

INPUT believes a distinction should be made between EDI implementation and related projects. Users may find that the efficiencies EDI offers can only be optimized by upgrading related systems, such as accounting, inventory management, or marketing.

Chapter VI reports the findings of INPUT's survey research examining EDI-stimulated application development. An upcoming INPUT study, *EDI and Professional Services*, will further examine this area.

7. Who Pays?

Most EDI third-party network services permit billing to be allocated between trading partners, based on the business relationship.

Internally, chargeback systems are being adopted to bill end-user departments for EDI transactions.

Often the hub of an EDI trading cluster will provide EDI software to its trading partners to encourage electronic trading.

8. Competitive Concerns

Several users reported they were investigating or implementing EDI because of competitive reasons: either their direct competitors were believed to be implementing EDI, or their major customers indicated (sometimes rather strongly) that future business would depend on the supplier's ability to handle electronic transactions.

The average rating given competitors' actions in EDI was a mid-range 3.3 on a scale of 5.

9. Internal Changes

On average, users rated their concerns over the changes required in converting paper forms to electronic methods above midrange—3.6 on a scale of 5.

Usually, the change from manual to electronic systems will involve parallel systems as the change over is implemented. This adds cost due to maintaining dual systems.

However, users converting to EDI that wish to trade with others maintaining paper-based systems can do so without operating a parallel system. Several network services will convert EDI data to mail-delivered paper documents, E-mail, or facsimile-delivered documents.

Users usually test one or a few documents at a time to allow for gradual system adoption with minimal disruption or "surprises."

Users have sometimes gotten "stuck" in pilots, primarily because EDI may have been implemented under the IS' direction without a corporate mandate or functional department champion. These pilots may have been considered demonstration projects by the IS department.

10. Legality

The acceptance of EDI-transmitted documents as binding contracts is left to the marketplace and negotiation between individual buyers and sellers.

Trading partners usually agree prior to electronic trading that EDI documents will have the same status as their paper-based equivalents, carrying the same terms and conditions as previously used methods.

A survey of several firms using EDI found that no industry-wide contract exists, nor was one advocated. At present, legal issues are best addressed by each individual trading partner in a relationship; furthermore, standardized legal agreements are not possible.

Legal issues commonly addressed by contracts between trading partners cover definitions, standards, how to share costs, and responsibilities for advising of changes in networks. Such contracts usually reference existing contracts as incorporated in the EDI trading agreement.

A committee of the American Bar Association and a European academic study group are evaluating the legal issues involved in electronic trading.

Assuming the EDI system verifies receipt of data with a functional acknowledgement, EDI transmissions have the same legal force as telex, which uses an answer-back code to verify message receipt.

11. Vendor-Related Concerns

a. Vendor Viability

Vendor viability was the highest rated vendor-related concern.

Users need assurances that any investment or effort incurred evaluating vendors and encouraging their trading partners to use a specific vendor will not be in vain.

Vendors rumored to be acquisition candidates, or facing unfavorable financial news (which may be unrelated to their EDI business) need to overcome users' perceptions of vendor instability. This becomes a public relations task.

b. Reliance on One Vendor

Users rated this concern slightly below midrange on a scale of 5, and it trailed all other concerns. Since there are more than 30 EDI software firms, and several vendors now offer EDI services, most users have options.

Service and software providers are reinforcing their relationships with customers through user groups and newsletters. It is obviously in their interest to maintain long-term relationships for maintenance and licensing agreements, add-on sales, professional service contracts, and other opportunities.

12. Human and Business Factors

There are a number of human and business factors to be considered by those promoting EDI systems.

a. Human Relationships

Relationships developed over time can hinder acceptance of EDI. People like personal contact with business associates.

One proprietary EDI system developer reported on how people factors become important.

- The system was initially perceived as a threat by both internal and external users. The project director worked to allay those fears through internal marketing and by designing the system with input from the external merchants who would use it.
- The system was designed to be flexible; a rigid system would cause frustration, leading to disuse.
- The company found that the system supplements human interactions and that personalities remain important.

b. Sales Staff Concerns

When EDI is implemented for marketing purposes, concerns regarding compensation and commission issues are often heard from the sales staff. Management is wise to avoid any changes in the commission plan, while recruiting the sales staff to sell EDI to the customer base for the benefit of all. At the same time, management should stress its expectations for improved customer service and market development through EDI.

One way of addressing sales staff concerns is a proactive management approach in co-developing (with sales) an EDI-related sales policy covering compensation issues and management expectations for additional personal customer service.

- The EDI system should be implemented in such a way as to route a copy (electronic or hard-copy) of a sales order or order confirmation to the account manager, or to allow access to monthly summary reports by salesman, product line and customer.

- EDI does not lead to bypassing salesmen or brokers, or impeding personal relationships in the sales channel.
- Rather, because less time is spent by sales staff correcting errors and handling routine paperwork, sales calls are more productive and sales staff can work in a close, consultative role with customers on new product development. Further, marketing strategies and customer service programs can be improved.

EDI generally reduces the number of routine phone calls. The remaining calls become more precise and productive; users have more background information, and know how they want to resolve issues.

EDI can also help mitigate the problem of high personnel turnover in order processing and similar clerical functions. Less experienced operators become more efficient due to the intelligence of the EDI system and can better represent their company.

c. Attitude and “Turf” Factors

IS managers are overcoming their protective postures regarding their facilities. There is growing recognition that IS serves the company and is not an entity unto itself.

Since EDI replaces current methods, functional managers have often developed protective attitudes toward their units and are sometimes resistant to change.

These problems point to the need for EDI to become a corporate-wide project.

- Not only can EDI benefit individual departments, but it benefits the entire corporation.
- However, top-down mandates for EDI need to be approached cautiously. Without functional and IS managers involved in the decision planning process, resistance can result.
- INPUT recommends a task force approach in implementing EDI.

13. How Is EDI Internally Sold?

Many companies have developed sophisticated marketing programs to encourage EDI usage within a company and the trading cluster. Often, a full-time EDI coordinator/marketer is assigned this responsibility. Marketing brochures, videotapes, and trading partner conferences are produced to encourage use.

In some cases, the hub company in a trading cluster has made EDI software available either at a discount or on an extended loan to encourage EDI trading. In other cases, a specific vendor has received an actual or de facto endorsement by the hub firm.

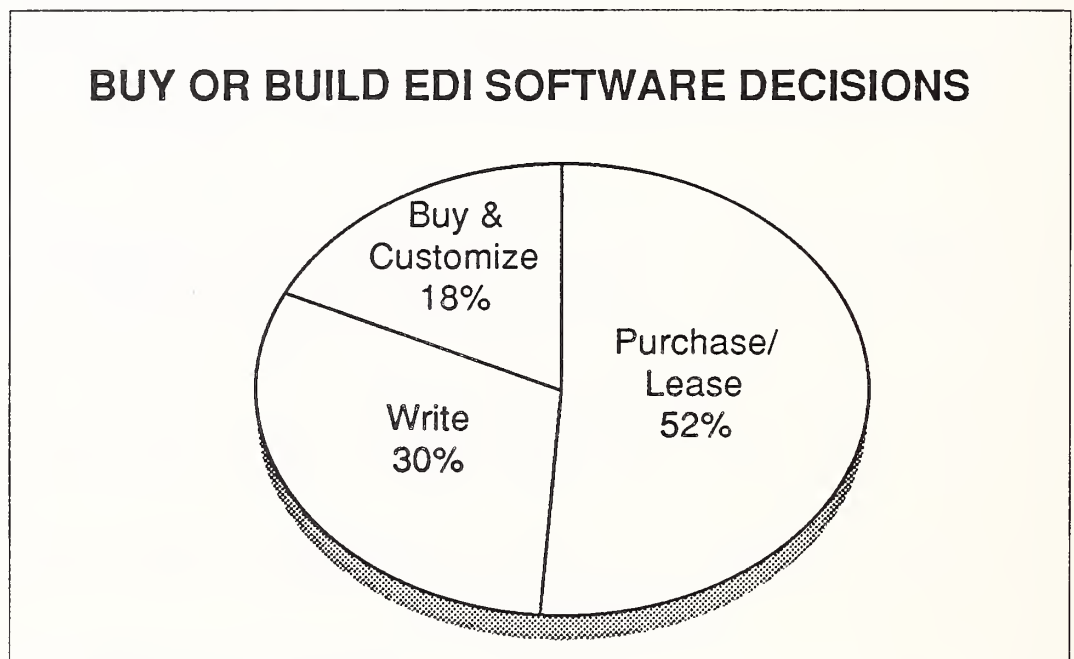
B

EDI Software Issues

1. Buy or Build the Software

INPUT asked current EDI users if they wrote, bought/leased or bought and customized their EDI software. As Exhibit IV-6 shows, over half of those interviewed bought/leased EDI software, approximately one-third chose to write their own software, while nearly one-fifth bought and customized their EDI translator.

EXHIBIT IV-6



Representative reasons for buying software include:

- “Why reinvent the wheel? Our customers were demanding we do EDI with them, and it costs too much to develop this sort of thing in house.”
- “Standards changes make it ludicrous to try to write this software. We have only six programmers of staff and they have better things to do.”

Companies that did write the software themselves gave the following representative reasons:

- “We wanted capabilities not limited to those offered by a packaged solution.”

- “When we got involved with EDI, no EDI software was available, but I wouldn’t take this approach again.”
- “The nature of our order-entry system required we write our own. No package can take the data the way our orders come in, and handle them the way we want.”
- “We were in no hurry, so we could spend the time and design it to our specs right from the start.
- “We analyzed what was out there first, but found nothing appropriate. Also, we have programmers on staff, and that’s what we pay them for, to write this stuff.”

Several of the companies reporting that they bought and customized a package were early implementors who adapted the TDCC software. One of these reported, “We bought the software thinking we could use it as is; however, the package did not meet our needs and we customized it beyond recognition.”

2. Choice of Software Package

Users gave a variety of reasons for buying a specific EDI translation package. Early implementors, particularly those using a mainframe solution, had few choices: They could write it themselves, based on published documentation; they could purchase the TDCC source code as the basis for their own application; or they could purchase an EDI translator from the one company offering it at that time—TranSettlements.

Other users cited a variety of reasons, including a point-by-point comparison of competitive offerings, recommendations from consultants, lowest cost (TDCC source code was available for only \$750), and impressions of the vendor’s commitment to the EDI marketplace.

3. Software Integration

No pattern emerges from the user research regarding what is required to ease the integration of EDI software with other applications. Most responses suggest users are focused on their internal structures in this area. Some examples:

- “Good programmers”
- “Priorities within our company”
- “To do it properly the first time”

- “More homogeneity in our own software”
- “More research and development on our part to see the best way we can integrate”

A few respondents suggest software providers can ease this process by providing “more specific guidelines” and “more user-friendly ways to map between our applications and the translator,” or by providing integrated EDI packages.

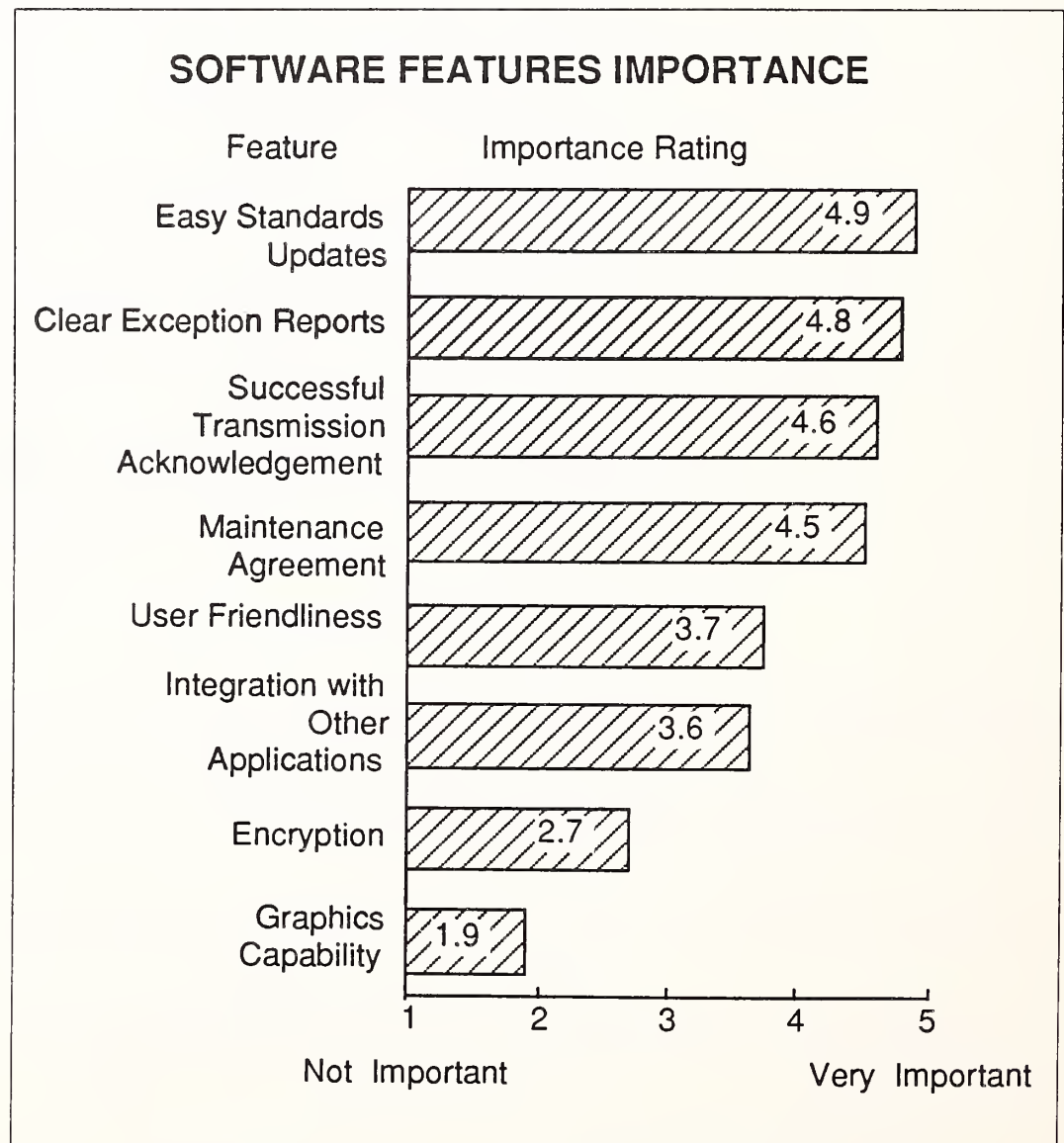
C

Software Features Desired

INPUT interviewed current EDI users about the relative importance of a variety of features. Exhibit IV-7 illustrates their average responses.

In keeping with users’ concerns about standards, the highest-rated feature is the ability to easily upgrade the package to support new standards.

EXHIBIT IV-7



The two second-highest rated features relate to feedback requirements. Users need to know that an EDI transmission was successful and if any transaction was refused because of improper entries or other reasons. Most EDI software provides exception reports that call out data elements not conforming to a standard.

The fourth-rated concern, availability of a maintenance agreement, is related to the first.

Ease of use was rated at higher-than-average importance, slightly above the requirement that EDI software be integrated with applications. This was a surprising finding, but may be due to the relative lack of integrated solutions.

Although security of EDI transmissions was a highly rated EDI concern, software encryption was rated by users as of less-than-average importance.

- Encryption is a desirable feature primarily when the transfer of electronic funds is involved, and is offered as an optional feature by some vendors.
- Others are wary of problems that can be caused by encryption, and hardware, rather than software solutions, may be more appropriate.

Data needs to be secure from unauthorized users and from loss due to power failure and/or loss of telephone connections. An automatic recovery system is usually built in to EDI software for just such occurrences. Vendors offer a wide variety of controls to help the user monitor transactions and detect errors in data formatting and transmission.

Graphics in association with EDI are being used in some industries, but in general, users do not see this feature as important and it received the lowest rating.

Features that provide flexibility are user-definable reports generation and user selection of which translation tables should be used by each trading partner.

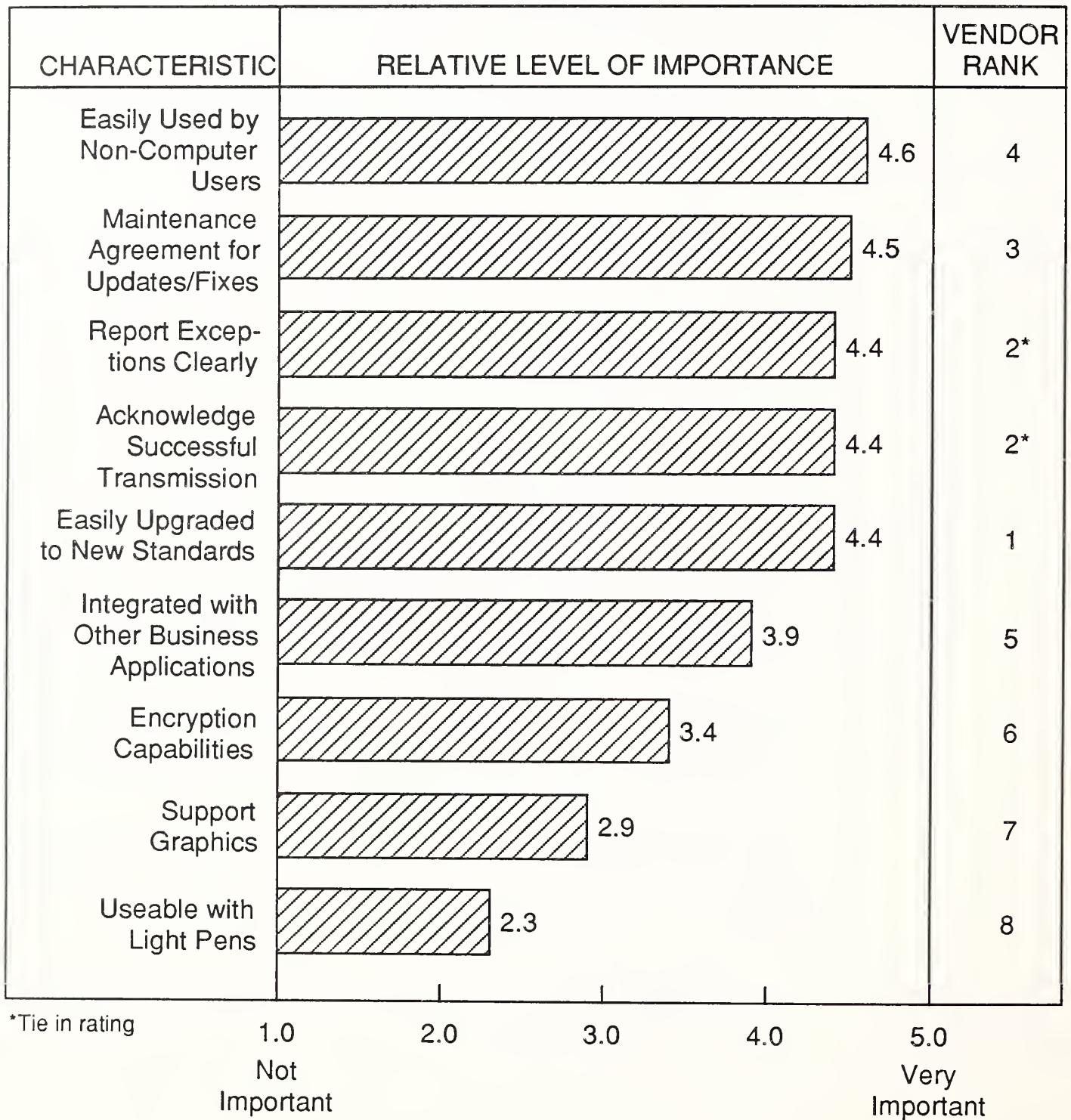
D

Federal Agency Ratings of EDI Software Features

In a 1987 INPUT research survey, 20 federal agency representatives were asked to rate the relative importance of specific software characteristics.

EXHIBIT IV-8

AGENCY RATING OF IMPORTANCE OF EDI SOFTWARE CHARACTERISTICS



- As noted in Exhibit IV-8, the most important characteristic was that the software be easily used by users that are not computer literate.
- The next most highly rated feature was that the software be accompanied by a maintenance agreement for updates or fixes.
- Currently, encryption capabilities and support of graphics are not viewed as important, but they may become more important when additional applications are added to EDI systems.

Also shown in Exhibit IV-8 are the rankings given to these characteristics by EDI vendor representatives.

In a surprising finding, agency and vendor executives reported exactly opposite views on the top five criteria. Also, federal users rated user friendliness more highly than did commercial market respondents.

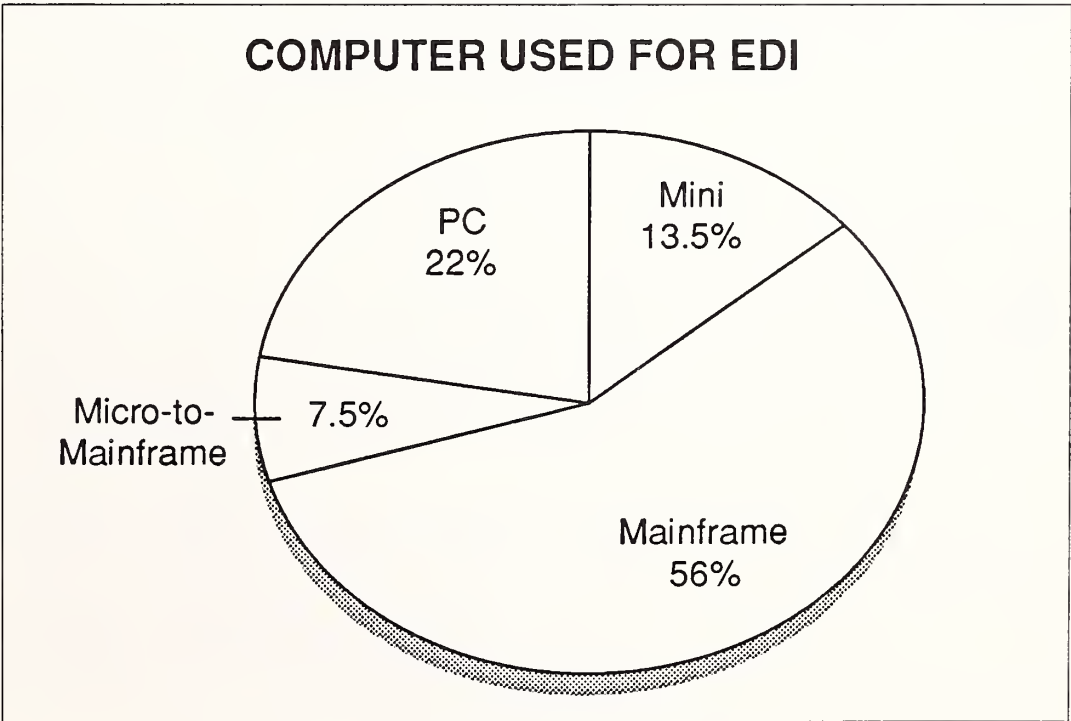
E

Computer Platform Choices

Exhibit IV-9 shows users' responses regarding the computer type (micro, mini, or mainframe) used for EDI functionality.

The combined reporting of multiple platforms indicates that users are isolating the EDI translator from the mainframe source of data by downloading flat files to the PC for external communications. In this manner, the PC serves as an intermediary step to accelerate the process of being able to use EDI, isolates the mainframe from direct external access for security reasons, and off-loads larger systems from EDI transactional processing.

EXHIBIT IV-9



INPUT believes that many micros will be used as front ends to mainframes and as standalone systems as EDI becomes accepted in more and more companies.

- Functional departments, such as purchasing, will likely implement PC-based EDI that will interface to mainframe applications, and will do so with only consultative assistance from IS departments.
- PC-based EDI is the easiest route for many users and speeds implementation, especially for those being urged to trade electronically by their customers or essential suppliers.
- Smaller companies will likely use PCs for EDI since they do not require mainframes or minicomputers for their processing needs.
- Further, PCs have become more powerful.

These points are summarized in Exhibit IV-10.

EXHIBIT IV-10

**MORE MICROS WILL BE USED FOR
EDI THAN SUGGESTED**

- Functional Departments Will Interface PCs to Mainframes
- PC Implementation—Easiest, Less Expensive
- Small Companies Do Not Have Larger Processors
- PCs Are Becoming More Powerful

F

**Computer Platform
Changes**

INPUT asked users if they intend to change the computer used for EDI. Thirty-eight percent indicated they would. Reasons given were:

- “We’ll need a larger mainframe to handle our EDI output.”
- “We’re moving from a PC-Mini configuration to an IBM mainframe with an integrated EDI system.”
- “We’re migrating from our PC/AT EDI implementation to an integrated mainframe solution combining our order entry functions with our EDI functions.”

- “We’re moving to a mainframe system to eliminate the human errors that can occur when we down-load data to the PC.”

Other users cited reasons for the change as external to EDI (e.g., the corporation is installing a new mainframe).

G

Integration Methods

Integration of EDI into mainframe production environments has been the most costly implementation based on internal allocation of resources. Links to applications, many of which were developed internally, need to be written.

EDI Project Managers rated the importance of having EDI integrated with other applications at 3.6, with a 5 rating being “very important.”

When asked how EDI integration would be performed, nearly 90% reported they would handle this function themselves. Only 11% said they would hire a consultant for this purpose, and only a few respondents said they would buy an integrated application with EDI functionality.

More than actual user preference, these results may indicate that there are relatively few integrated products currently on the market. Integrated solutions, both mainframe- and minicomputer-based, are now being introduced. Vendors are betting that users will choose these packages over in-house development. Increasingly, user requests for proposals are requiring EDI functionality.

Approaches to mainframe integration of EDI with other applications are changing. Whereas in the past an EDI software provider would offer the source code and necessary tables for the user to perform integration with existing applications, several major application vendors (such as MSA, Pansophic, McCormack & Dodge, and others) are now easing this process.

These vendors are offering EDI modules (usually sourced from other software firms) in conjunction with professional services for integrating EDI and related applications such as purchasing and accounting.

This obviously eases requirements on users that are reporting increasing development backlogs (see Exhibit V-2 in the next chapter), and that may be feeling pressure from corporate managers to implement and integrate EDI.

Of course, users can do the integration themselves. Several vendors allow the interface between the EDI software and the user’s internal files to be accomplished through skeletal programs.

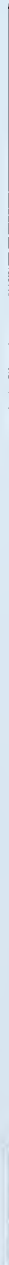
- Skeletal programs are incomplete.
- They require additional procedural code written by the user.
- Sending modules select and extract, reformat/analyze, verify, and generate appropriate transaction sets and select the desired communication media.
- Receiving modules gather, edit for acceptance/rejection, and translate transaction sets into the user's internal system formats.

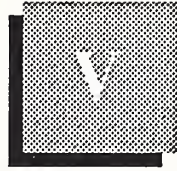
Another integration approach is the generic interface to make it easier for users to place EDI-formatted data into their own applications.

The next chapter examines EDI market inhibitors and activators.



EDI Market Inhibitors and Activators





EDI Market Inhibitors and Activators

In any emerging or continuing technology-based market, there are usually technical and business factors which affect acceptance and/or rejection, and thus impact market acceptance and vendor success.

This chapter first acknowledges and addresses factors that may inhibit EDI's development, then describes EDI market drivers which will likely overcome inhibitors.

A

Market Inhibitors

Most of the inhibitors shown in Exhibit V-1 are self-descriptive, but some discussion will help clarify users' concerns.

1. Resistance to Change

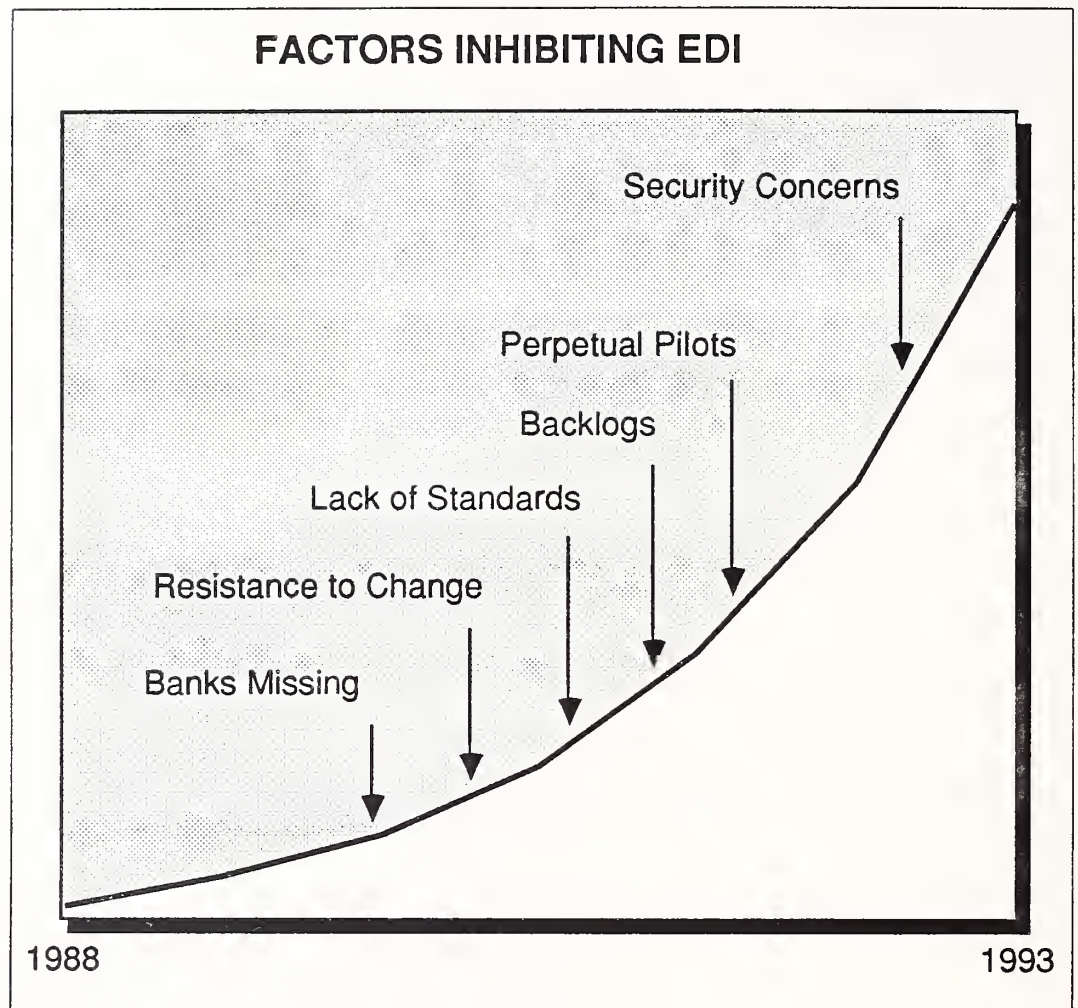
Without management directives to implement EDI, many corporate end-user departments are static, handling business as they always have. The press of daily activities and "turf" factors often prevent advanced planning and inhibit planning across department lines.

Since EDI can reduce headcounts, management should be aware of labor-relations issues and should use attrition and reassignment to adjust department loading.

2. Perpetual Pilots

IS departments have often launched EDI pilots to gain experience with the technique. However, end-user departments may not be aware of the opportunity available due to poor internal marketing, and may be unwilling to participate without a corporate commitment and department involvement in system development.

EXHIBIT V-1



3. Backlogs

INPUT's surveys have found that for 42% of the users questioned, the applications backlog has increased, as shown in Exhibit V-2.

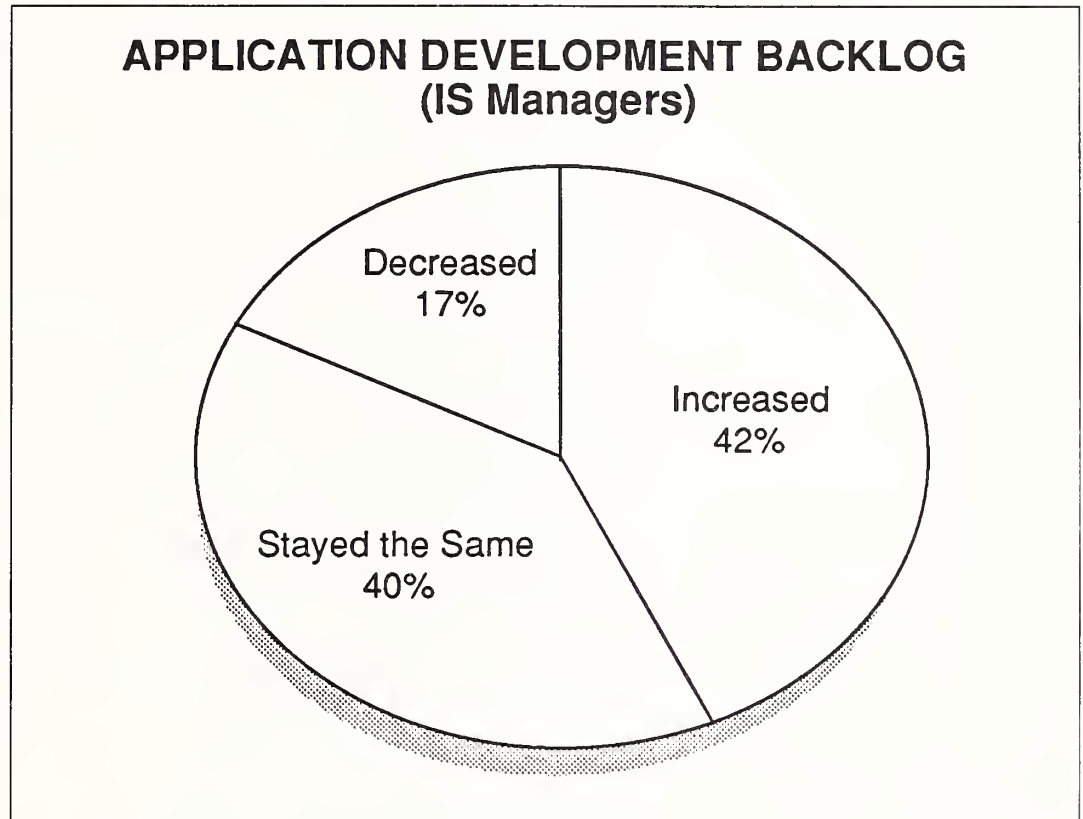
An applications backlog may prevent IS departments from implementing EDI without an additional resource allocation and a priority impetus from corporate management.

As the scope of EDI implementation, with the implied integration requirements, becomes clearer, IS will find it is not dealing with just one new application. Entire systems may need adjusting to respond to the change.

4. Perceived Lack of Standards

Although there are an ample number of transaction sets covered by EDI standards, including those developed to conform to industry-specific needs, many users perceive standards as unsettled. This is illustrated in the survey findings, which place standards and compatibility at the top of the concerns list.

EXHIBIT V-2



For companies believing that standards are deficient, an appropriate response is to become involved in developing the standards for unique industry, or corporate, requirements, and to develop an understanding of the standards and their relationships.

5. Security Concerns

Although network service vendors work to ensure data security, many companies are reluctant to allow links to their production mainframes for fear of security breaches.

Some companies are concerned about internal authorizations and duplicate paper and electronic transactions.

Encryption and authentication techniques are available for users requiring secure transactions.

6. Banking Services Missing

As a group, banks have been hesitant about becoming EDI service providers. First, there are questions about their appropriate role: Should they be service providers in their own right, or should they be working with other providers to complete the cycle in a buy/sell transaction with an electronic funds transfer (EFT), accompanied with EDI information about the payment?

Secondly, banks have been concerned about the ability of their existing EFT networks to carry the volumes of data traffic possible with EDI.

With the exception of the institutions involved in General Motors' electronic payments program, banks are largely waiting for other banks to get involved in EDI. If banks are to provide EDI payment services, they must have electronic relationships with other institutions ready, willing, and able to accept EDI/EFT transactions.

INPUT believes that the uncertainty of the banking industry regarding its appropriate role in the EDI market is inhibiting users from optimizing, and in some cases, adopting, the technique. There will be greater recognition of EDI's benefits when a purchasing transaction can be culminated in an electronic payment, meaning the banks need to participate and help develop EDI services.

Chapter VI discusses EDI software being targeted toward banks seeking participation in the EDI market.

B

Market Activators

INPUT believes the market's driving forces will overcome existing inhibitors. There is clearly a convergence of technological and business factors that are driving EDI usage, as shown in Exhibit V-3.

1. Cost Avoidance

Many companies have looked to EDI as a means of reducing expenses. This is especially critical in manufacturing industries such as automobile, heavy equipment, and apparel, where offshore suppliers have put severe price pressures on "made in U.S.A." products. However, cost avoidance is usually not the sole reason for adopting EDI. Corporations are increasingly pursuing EDI for strategic or competitive reasons.

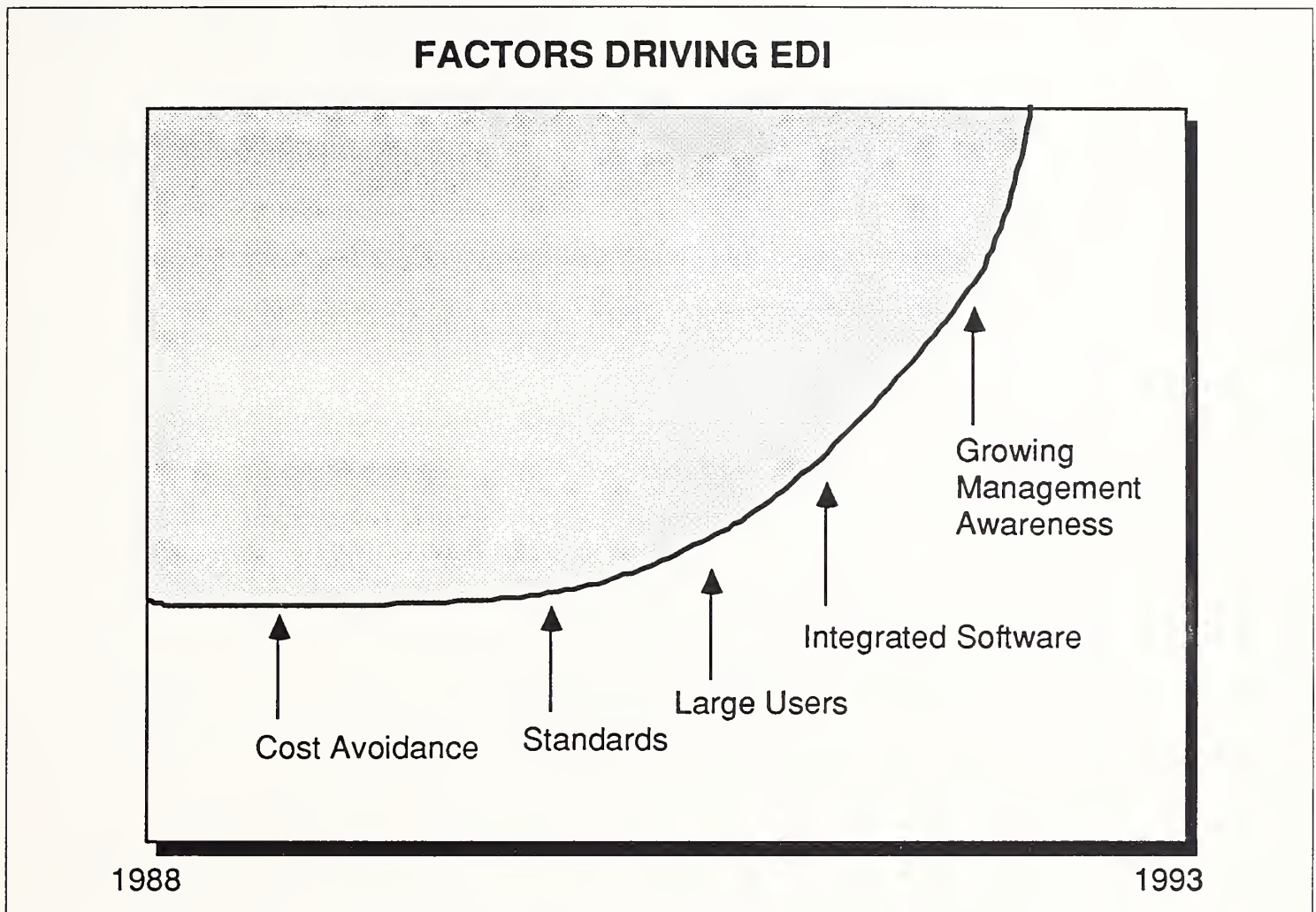
2. Large Users

Companies dominating their industries have forced dependent suppliers to use EDI as a condition of doing business. Others have offered discount prices as an incentive to use electronic channels for trading. Regardless, the result is "a domino effect" that can affect an entire distribution and manufacturing chain.

3. Integrated Software

Although few packages are currently available "off the shelf," major software providers are starting to provide EDI modules to manufacturing, inventory management, and financial applications to expand the utility of their products, to improve add-on sales, and in response to customer demands.

EXHIBIT V-3



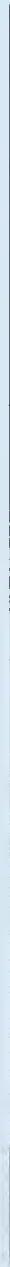
An integrated EDI solution can generally be installed more easily than one requiring data mapping and customization.

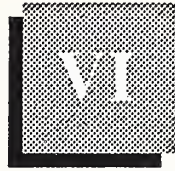
Several of the “major” software companies (e.g., DEC, MSA, McCormack & Dodge, Pansophic, and ASK) are embracing EDI, and there is evidence that other firms are becoming involved—if not directly, then through partnering.

The next chapter examines the EDI software market and the directions representative competitive vendors are taking.



EDI Software Markets and Directions





EDI Software Markets and Directions

This chapter examines trends in EDI software markets, with particular attention to emerging approaches in addressing the EDI opportunity.

A

Marketing Strategies

1. Alliances

a. Agents and Certified Software

EDI market participants have formed a variety of experimental alliances to share the risks associated with an early market.

Although it offers its own EDI software, General Electric Information Services has agreements with several software vendors (including software competitors) to act as EDI service agents.

- These agents focus on their target markets and share in the network revenues generated by their accounts.
- GE's EDI agents include ACS Network Systems (Concord, CA) for sales to the apparel industry, American Business Computer (Farmington Hills, MI) for sales to the auto industry, Can/Am Tech (Hamilton, Ontario) for sales and support in the metals industry, McCormack and Dodge (Natick, MA) for software integration, MSA (Atlanta, GA) for general joint marketing, and Supply-Tech (Southfield, MI), for sales to the auto industry.

IBM's Industry Marketing Assistance Program takes a similar approach. Among participants in this program are American Business Computer, American Custom Software, ACS Network Systems, Carol Baggerly and Associates, Computer Task Group, Louis Wright and Associates, Metro Mark Integrated Systems, MSA, and Supply Tech.

McDonnell Douglas has an EDI software certification program that has created informal service agent relationships, bringing new customers to the network.

- For a short time, MDC offered free EDI network services for a three-month period to new accounts using one of its certified software vendors.
- Over 30 software companies are certified by MDC.
- This approach replaced MDC's efforts as a distributor of EDI software when it found that only 5% of its EDI traffic could be traced to software it placed.

Western Union has also taken a certified software approach.

TranSettlements, though now focusing on mainframe products, has entered a variety of relationships. For example, MSA purchased the rights to integrate TranSettlement's software with MSA's Expert series. A variety of other relationships have been formed for referrals, joint marketing, and remarketing. TranSettlement's Transend software is also used on a time-shared basis through Martin Marietta Data Services EDI service.

Some EDI software vendors hope to recruit their larger users as distributors. Discounts are offered on volume purchases with the user distributing to customers and clients who are encouraged, sometimes with pricing incentives, to migrate from paper to electronic systems.

In some cases, a network services firm (i.e. Transnet) or a transportation carrier (i.e., Southern Pacific) has distributed EDI software to its customers *gratis* to encourage usage and customer loyalty. Usually, the software is limited to accessing that one service or vendor.

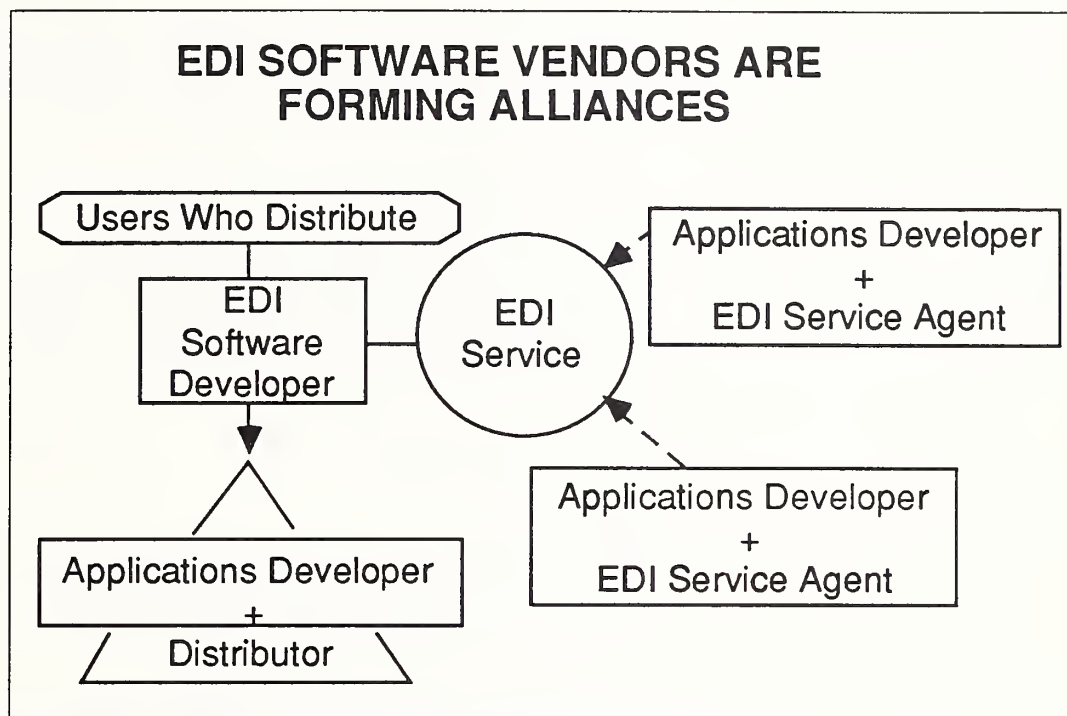
Exhibit VI-1 illustrates the types of alliances and relationships found in the EDI software market.

Future alliances, and possibly mergers, are projected as the missing players seek to add EDI capabilities to existing software and turnkey solutions, and as service providers broaden their offerings to encourage network use.

b. The Regional Bell Operating Companies as Potential Partners

Recent rulings by Judge Harold Greene have been interpreted as permitting the Regional Bell Operating Companies (RBOCs) to offer EDI services. At least two RBOCs have indicated intentions in this direction.

EXHIBIT VI-1



One likely strategy of the RBOCs in EDI and information services in general is to be “full service” providers. This strategy means providing a full set of services and products in support of an EDI offering. EDI software will likely be a part of this strategy.

2. Platform Strategies

Although some EDI software providers have focused on one computer platform (micro, mini, or mainframe), others are offering software for a variety of computer types. Often, this offering is done through an alliance. For example, Metro-Mark’s mainframe offering was actually developed by Crowntek, a Canadian firm. (Although Crowntek has dropped out of the EDI market, its spin-off, Lakestone Systems, continues to support the mainframe product.)

a. IBM Alternatives

The majority of EDI software is written for IBM and compatible systems. Increasingly, software is becoming available for other computers.

- Penwill (Riverside, CA) offers software for Hewlett-Packard.
- Birmingham Computer Group (Birmingham, MI) offers DEC software, as well as other platforms.

b. On-Line Transaction Processor (OLTP) Platforms

OLTPs, also called “fault-tolerant” computers, generally are systems designed for high-volume, transaction-oriented environments where

system availability is required at all times. Systems from Tandem, Stratus, and Prime fall into this category, and systems from other vendors (notably IBM and DEC) are being positioned for this class of applications.

EDI in an OLTP environment is suitable for larger companies where a high volume of EDI transactions take place, and where continuous-flow manufacturing philosophies and their variants have been adopted. Accordingly, EDI software is being ported by several vendors to systems supporting OLTP.

3. Major Player Strategies

a. IBM

IBM's EDI effort, through the IBM Information Network, uses marketing alliances under the Marketing Assistance Program (MAP).

Separately, an alliance with Qronos Technology Inc. (Santa Clara, CA) has EDI overtones. Under the agreement, the companies will jointly market software to control various aspects of manufacturing, including order management. Initially targeted industries are electronics, chemicals, and pharmaceuticals.

IBM officials have not ruled out IBM-labeled EDI software products in the future. IBM's latest reorganization created a 6,000 member division called Applications Systems and dedicated to software development.

- This unit has established focus groups in "usability labs" to test new packages for user acceptance and ease of use.
- The Applications Systems Division would be the likely source of any new IBM EDI applications. Enhancing existing manufacturing software such as MAPICS with EDI functionality is another IBM option.

b. Digital Equipment Corporation (DEC)

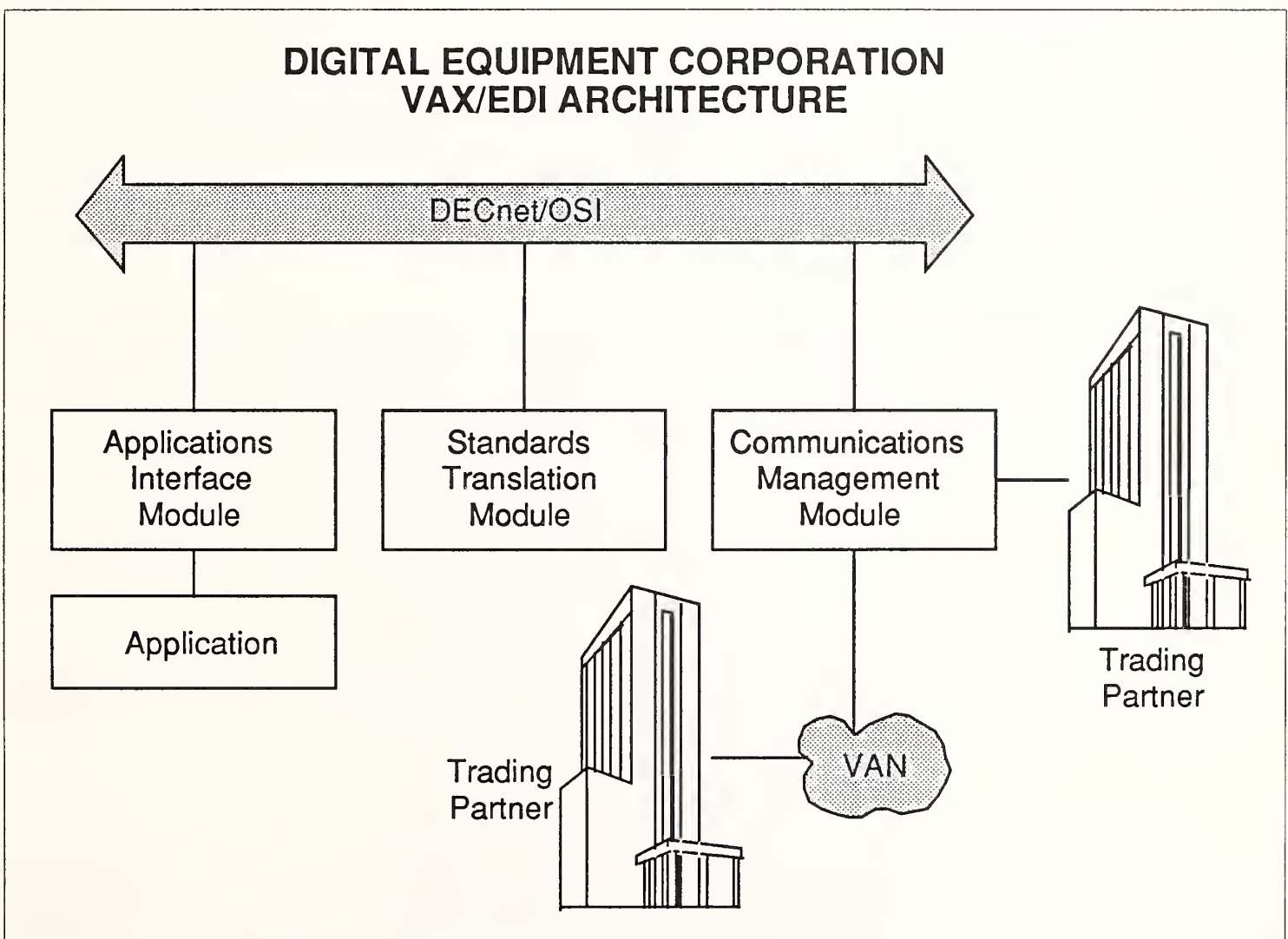
DEC officials have indicated that the company will be focusing products on EDI, drawing heavily on DEC's own internal use of the method.

- DEC's European operations have already announced EDI software and U.S. product announcements are expected.
- In the U.S., DEC has entered relationships with Birmingham Computer Group (BCG) and Interchange Systems Inc., while other companies are reportedly adapting EDI software for DEC environments. (ASK, a manufacturing turnkey systems company that uses DEC equipment, also has an agreement with BCG.)

DEC's approach will be to position its products for both the external and internal requirements of EDI. In other words, DEC sees EDI as not only a trading-partner function, but one of enterprise-to-enterprise communications, even when those enterprises are part of the same corporation. Central to DEC's overall messaging strategy is the company's adoption of the X.400 standard.

Architecturally, DEC's EDI approach places the three modules of an EDI system (application interface, translation, and communications) on the Mailbus and DECnet/OSI network foundations, as shown in Exhibit VI-2.

EXHIBIT VI-2



- Presumably, the EDI function will be expanded to IBM applications via SNA Gateway products, and to other DEC applications, including office systems and perhaps office videotex.
- Mailbus software intends to ease intersystem communications of all types (graphics, forms, images, and voice) while maintaining original

attributes. Mailbus also facilitates data delivery to applications, and handles communications through various means, including LANs and VANs.

c. Apple

To date, no EDI software is available for Apple computers. INPUT believes that Apple's internal EDI development may stimulate product development.

Apple's spun-off software firm Claris does offer a forms package that could be adapted as an EDI product. Sources within Apple report several EDI software developers are interested in becoming certified Macintosh developers.

Apple has in the past focused on standalone personal computers, but is now pushing corporate sales. The year 1988 was designated Apple's "year of networking and communications." The company purchased two software development companies to help Macintosh computers communicate with larger systems, including those operating in IBM's SNA environments.

Although adopting EDI could lead to internally developed solutions that could then be productized, products may also come from a new European Research and Development Center, drawing on European Integrated Services Digital Network (ISDN) developments.

Corporate customers now generate Apple's largest single source of revenue, and are contributing the most to the company's corporate growth. Apple's goal is to achieve a 20% share of the market for business personal computers.

If Apple hopes to continue gaining acceptance in business, EDI will be required. Plus, the Macintosh's graphic abilities could be an advantage in EDI/graphics usage.

d. Apple and DEC Joint Development

Although Apple's internal EDI will likely be based on the company's Tandem systems working in conjunction with Apple personal computers (most likely Macintoshes), Apple and DEC are working under an agreement outlined in January 1988 to provide a jointly developed and endorsed environment for common communications.

This approach, based on the AppleTalk proprietary LAN and the DECnet/OSI networking foundation, is intended to create opportunities for third-party developers to write networked end-user applications.

Under the plan, customers will have the benefits of a highly integrated environment with a consistent, intuitive Macintosh user interface, AppleTalk network transparency and services, VAX computing power, and enterprise-wide DECnet/OSI networking connectivity.

It is intended that DEC's compound document architecture Digital Document Interchange Format (DDIF)—which encodes revisable text, graphics, and image data—will be supported by Apple through Apple File Translators (AFT), which will convert DDIF files into Macintosh file formats.

Regarding business communications, at a later time Apple will offer a messaging service allowing access to DEC's Mailbus and X.400-based mail systems. This capability will support store-and-forward messaging.

4. Network Service Strategies

As a class, EDI network service vendors are primarily motivated to generate network traffic. Accordingly, early EDI software offerings from this source may have been limited in their ability to link with other third-party networks.

In general, initial EDI software offerings from network companies have also had limited functionality and low prices. For example, Control Data Corporation's PC-based package was priced at \$500 while most other PC software averaged \$3,000. If a network offered fuller EDI software packages, they were through alliances such as described above.

There are indications this approach is changing.

- GE Information Services has upgraded its mainframe translator with new features and added a new mainframe offering called EDI Central. EDI Central is specifically targeted at large, multilocation companies. It controls a company's EDI functions from a single point and supports what best can be called "internal EDI" among a company's disparate computer types and application systems.
- Sterling Software Ordernet has established an EDI software unit. Although its primary mainframe product, Gentran, was developed by an outside provider (R.J. York and Associates), the company is planning to marry the product to one produced by another Sterling Software unit. Gentran and Tracs/Supertracs software will be combined to create a package with enhanced communications capabilities.

5. Full-Service Strategies

Although large user companies may have the staff resources necessary to evaluate, pick, and choose the software, services, and equipment best

suited for a specific implementation, many companies find one-stop solutions most convenient.

Accordingly, software companies are finding their understanding of network services and communications equipment is important to clients. Formal relationships with network services as EDI agents and resale agreements with equipment providers (modems, emulation boards, etc.) may be profitable for vendors as well as convenient for customers.

Usually, software providers offer installation assistance as part of the package price. However, these activities are rightly limited to the EDI function alone. Since optimization of EDI requires building links between several applications and departments, software firms are becoming more active in providing professional services.

Advanced software features may fit a limited number of customers' needs, but will enhance a software provider's image for all customers, and will differentiate the package. Adding value also provides advantages since internally developed EDI systems generally support only transactions.

- For example, the merger of images such as computer-assisted design and manufacturing (CAD/CAM) files with EDI will be increasingly relevant in industries such as apparel, aerospace, federal government, speciality manufacturing, and electronics. EDI/graphics integration supports design, specification, and blueprint exchanges between trading partners.
- Several EDI and EDI-like graphics services have emerged, the most notable being GE's Design*Express, which uses a version of the IGES CAD\CAM standard and offers software supporting the function.
- The EDI software firm Supply-Tech (Southfield, MI) is now promoting graphics in association with EDI. The company has developed a new XFR EDI segment called colloquially an EDI Paperclip; the segment allows EDI-formatted data and other data to be intermingled. Supply-Tech also promotes its software as capable of transferring graphics using a high-speed (19.2 Kbps) modem over dial-up lines.

6. Point-to-Point EDI Strategy

Trading partners exchanging large volumes of EDI data may chose to bypass third-party network services and handle communications directly.

Although not strictly using EDI software since it does not provide translation, at least two companies are positioning communications software for direct EDI interchanges:

- Sterling Software's Software Labs Division (Rancho Cordova, CA) offers TRACS and SUPERTRACS file transfer and communications software that handles a variety of line speeds, protocols, and management functions.
- Cincom Systems Inc. (Cincinnati, OH) and Netlink Inc. (Raleigh, NC) offer Interhost SNA Hub support for Cincom's Net/Master product, which handles file transfers between IBM mainframes.
- American Custom Software (Cookeville, TN) takes another approach that is clearly EDI since it does provide a translation capability.
 - The EDI Business Partner Network is designed for use in a trading cluster via direct phone lines. However, the software also offers access to third-party networks.
 - The system is a PC/AT-based front-end communications and mailboxing platform for users' systems.

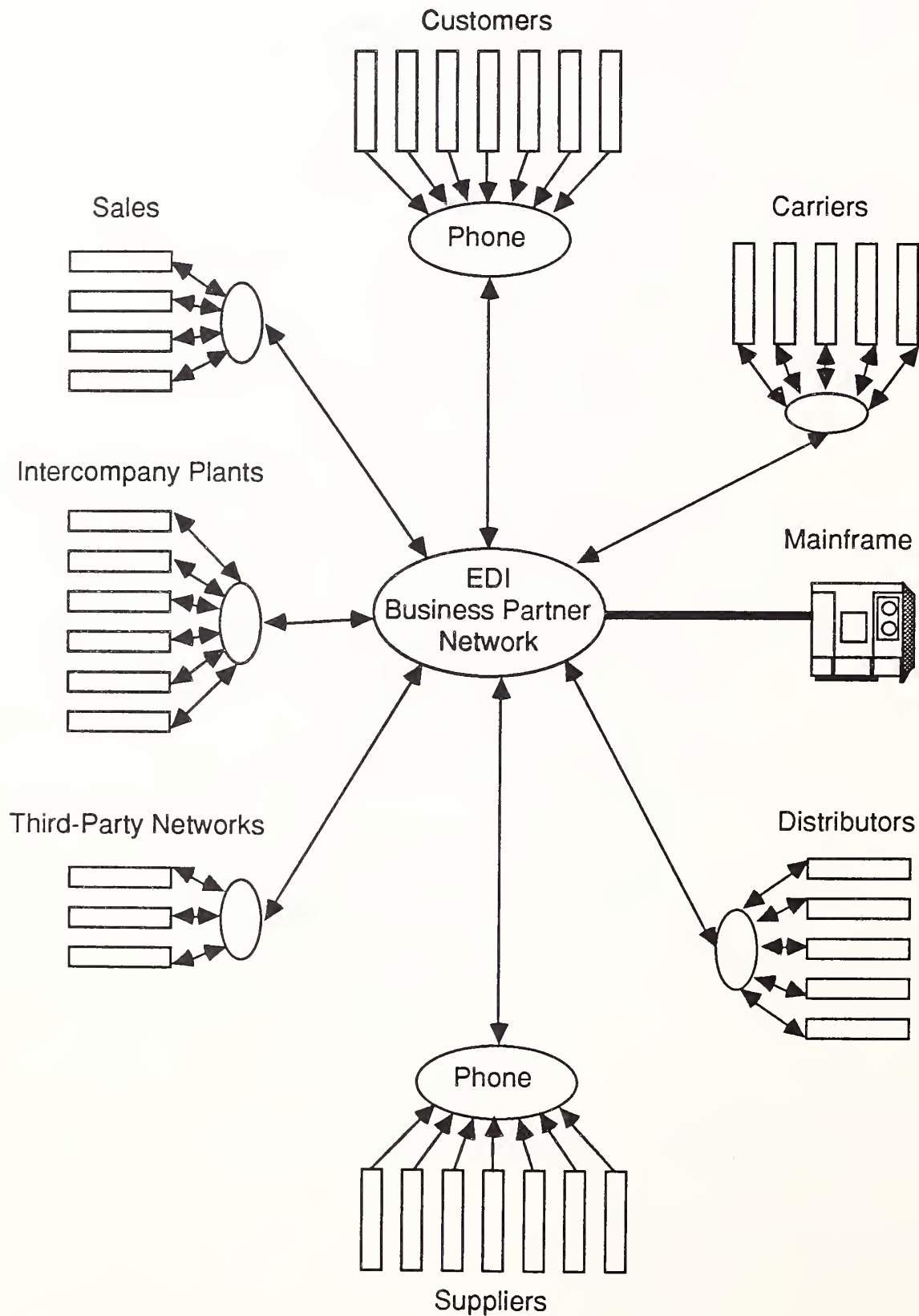
In addition to translation and communications, software associated with this approach generates error reports, controls special processing as needed, profiles all business partners authorized to use the system (along with their operating parameters), maintains a communications log, and creates back-up files.

American Custom Software says that by using point-to-point communications, users eliminate monthly fees and the loss of data system control associated with third-party networks.

Exhibit V-3 shows a schematic of American Custom Software's approach to EDI.

EXHIBIT VI-3

AMERICAN CUSTOM SOFTWARE'S EDI APPROACH



B**Banks as EDI
Software Prospects**

In a survey of 193 banking executives conducted for INPUT's multiclient study *Banking and Financial Services: The Next Decade*, 55% reported current or planned EDI projects, with regional and money center banks reporting the highest levels of involvement or planning.

Although these findings indicate interest, the evidence shows that banks have been conservative in their approach to EDI services, wrestling with their appropriate roles as potential full-service providers or as conduits for Electronic Funds Transfer (EFT) operations associated with EDI transactions.

Two key banking industry concerns relative to EDI are the capacity of existing banking networks to carry the data volumes EDI will require, and questions on liability for errors in transmission.

EDI services in banking are usually related to the industry's Automated Clearing House (ACH) EFT payment systems, and are seen as closely aligned with the cash management services many banks offer corporate customers.

Accordingly, software permitting banks to participate in the EDI market is appearing, and INPUT is aware of several software companies targeting this segment. The timing is appropriate.

Bank EDI/EFT activities are starting, with the best-known examples being freight payment services, the U.S. government's Vendor Express electronic payment program, services provided for General Motors by a consortium of banks, and document EDI services for international trade applications.

International trade EDI services are usually offered by bank-owned Export Trading Companies. Several now offer EDI-compatible electronic letters of credit that are transmitted into the back-office processors of international correspondent banks. Software supporting these services is provided by Integrated Cash Management Services (New York), American Management Systems (Arlington, VA), Micro Bank Automation (Atlanta, GA), Kapiti (London), and others.

In 1987-1988, intelligent telex services emerged that convert incoming telex documents, such as letters of credit, into standardized formats for further bank processing.

- One such service is provided by MCI International (Rye Brook, NY) with an EDI-like money transfer service called Automated Money Transfer Service (AMTS).

- AMTS uses artificial intelligence to evaluate unformatted telex information, sending standard format payment instructions into a subscribing bank's system.

Mortgage bankers are just beginning research on adopting EDI techniques. The plan is to use X12 formats for Computerized Loan Origination (CLO) documents as well as transactions such as title insurance applications. This will create a bridge between insurance "Interface" EDI and X12-type EDI.

1. National Data Corporation (NDC)

National Data Corporation (NDC—Atlanta, GA) provides specialized data processing, facilities management services and professional services in bank cash management, credit card processing, and other areas. NDC is evaluating its appropriate role in EDI services, primarily through its client banks.

NDC's major EDI activity is a developing service/product called NEDX or National Electronic Data Exchange, which leverages NDC's relationships with users of the company's NETS product for electronic banking and data transmission. This service aligns EDI with cash management, but sees banks taking an active responsibility for the movement of EDI data beyond payments.

NDC's primary thrust into EDI services hinges on the assumption that users will see banks in more than their traditional roles as money managers and money movers. Clearly users will require more financial services within their EDI functions, but the question is: Will banks be able to supplant existing third-party EDI services that can add financial services through affiliations with banks, or by buying banks to gain access to Automated Clearinghouse networks?

2. Interchange Systems Inc.

Interchange Systems Inc. (ISI—Lexington, MA) is targeting banks as prospects for its products. NetPay is designed to allow banks to become full EDI service providers (i.e., not limited to EDI/EFT), whereas the PC-based NetMate is designed for distribution to a bank's customers.

ISI officials report success in selling the products to Canadian banks following a General Motors of Canada decision to use a U.S. bank (First Chicago) for expansion of EDI/EFT services. GM/Canada found that no Canadian banks were ready for the services GM had in mind. ISI's NetPay was originally developed for GM's paperless payments system.

3. National Systems Corporation

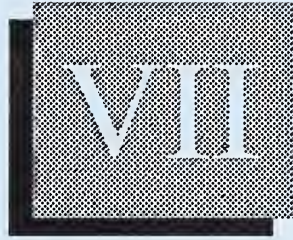
Another approach to bank EDI has been taken by National Systems Corporation (New York, NY). The company recruited five banks into a multiclient research project on the business requirements and software systems needed to augment existing bank infrastructures for new EDI/payment services.

- The five participating banks, Bank of America, Chemical Bank, Citibank, Manufacturers National Bank of Detroit, and Pittsburg National Bank, were already EDI active.
- The study involved staff from marketing, IS, and operational areas at each bank.

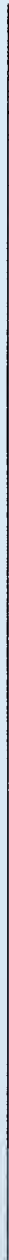
National Systems then began developing products incorporating the key attributes identified in the study. Initial installations were scheduled for late 1988.

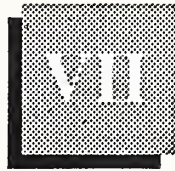
In-depth profiles of these and other EDI service and software providers can be found in companion INPUT reports.

The next chapter presents INPUT's market forecast and identifies EDI software opportunities.



EDI Market Forecasts and Opportunities





EDI Market Forecasts and Opportunities

This chapter presents INPUT's EDI forecasts and focuses on the EDI software market. It also identifies specific opportunities and summarizes INPUT's observations about the EDI software market.

A

Marketing Forecasts

1. The Aggregate EDI Market

The entire EDI market consists of user expenditures for EDI software, professional services, and network/processing services in the commercial and government market segments.

Although the network/processing services portion of this market includes the Electronic Medical Claims and Batch Insurance Interface varieties of EDI, the software and professional services sizing does not.

A companion INPUT report, *North American EDI Service Analysis*, breaks out the various components of EDI network/processing services.

As Exhibit VII-1 shows, INPUT sizes the total 1987 EDI market at \$131 million. The market will grow at an average annual rate of 56% to become a \$1.9 billion market by 1993.

About 12% of the 1987 commercial market is attributed to EDI software, with processing/network services making up the majority of the market, and professional services the balance, as shown in Exhibit VII-2.

INPUT believes that processing/network services will continue to make up the largest portion of the EDI market throughout the forecast period, and that the software share will decrease.

EXHIBIT VII-1

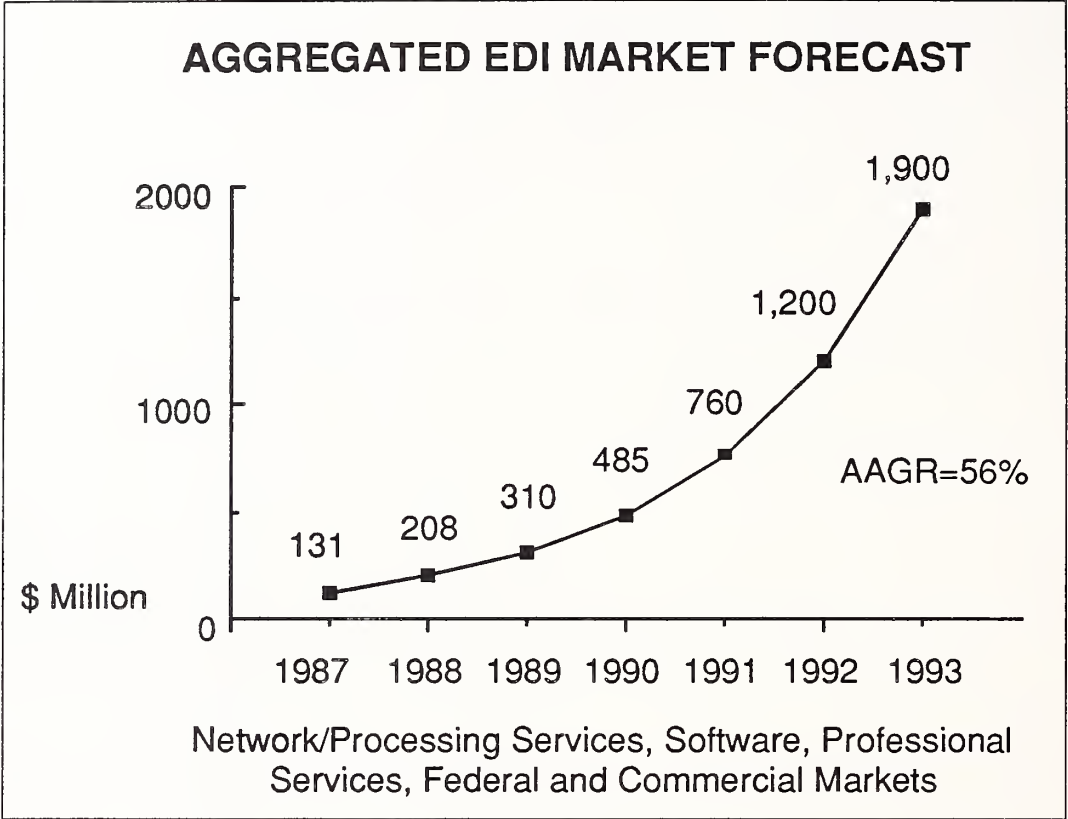
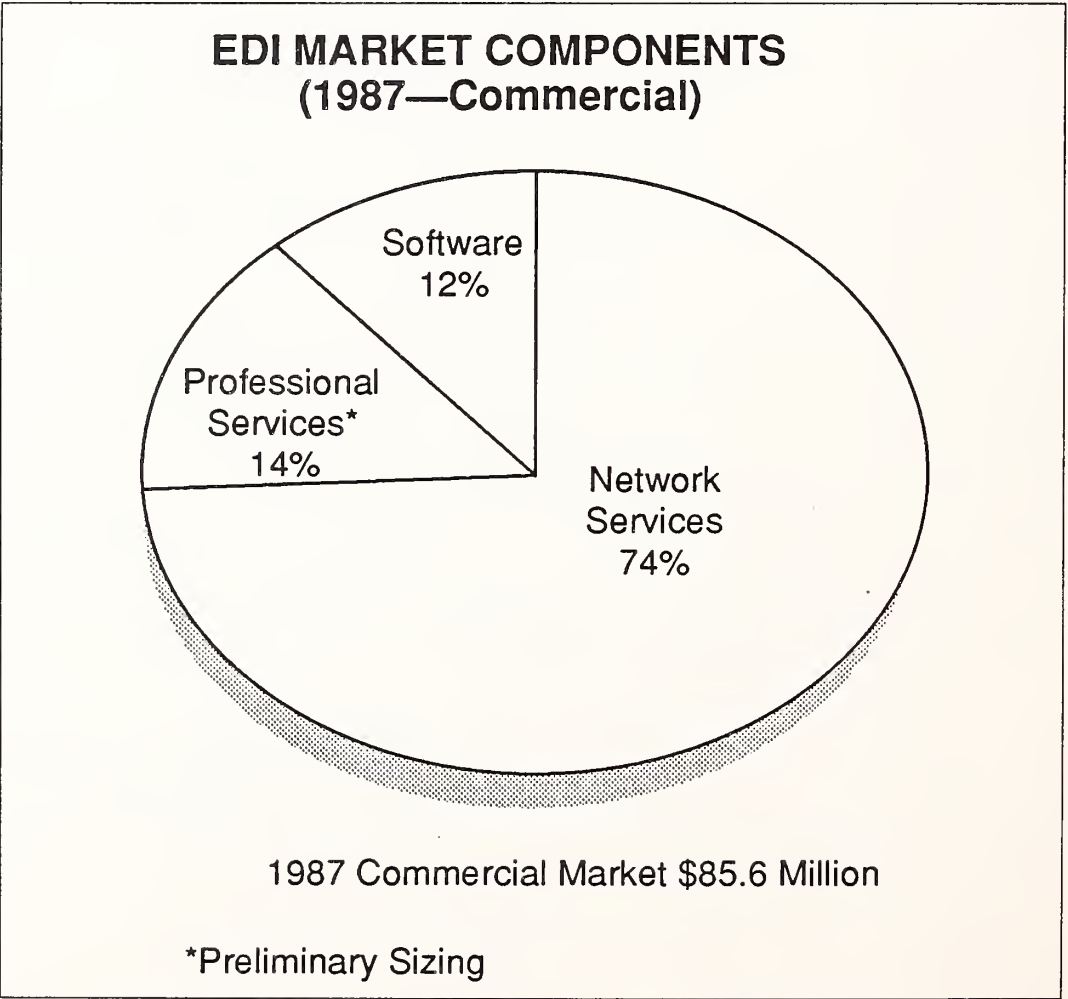


EXHIBIT VII-2



2. EDI Software Forecast—Units Sold (Commercial Market)

Exhibit VII-3 shows the forecast number of units sold for each computer platform (micro, mini, and mainframe), and the total number of installations forecast.

The growth shown in microcomputer software is based on INPUT's analysis that large numbers of smaller companies will adopt EDI to satisfy the conditions of doing business imposed by larger trading partners. Further,

- Many small companies will not have requirements for larger processors.
- Some companies wish to isolate their mainframes from telecommunications access for security reasons.
- Micros are becoming more powerful and more able to handle the transaction volumes required by most users.

3. The EDI Software Market Forecast—User Expenditures (Commercial Market)

Exhibit VII-4 shows the user expenditure forecast for each computer type and the total.

The forecast assumes declines in the average selling price for each type of software over time, as shown in Exhibit VII-5.

INPUT expects the commercial EDI software market to grow from the 1987 base of \$11 million to become a \$105 million market by 1993, reflecting a 44% AAGR.

Exhibit VII-6 shows 1987 market share data based on vendor revenues. Information about specific software vendors can be found in a companion INPUT report, *EDI Software Provider Profiles*.

4. EDI Software Market—Federal User Expenditures

The definition of EDI in the federal government is often applied to unique agency needs not found in the commercial marketplace.

In its study, *Federal EDI Initiatives*, INPUT's Federal Information Systems and Services research program has sized the 1987 Federal EDI market at \$97 million, and predicts that the market will grow 11% annually to become a \$230 market by 1993, as shown in Exhibit VII-7. Federal EDI software expenditures, sized at nearly \$29 million in 1987, will grow at an AAGR of 4.5% to become a \$36 million market by 1993.

EXHIBIT VII-3

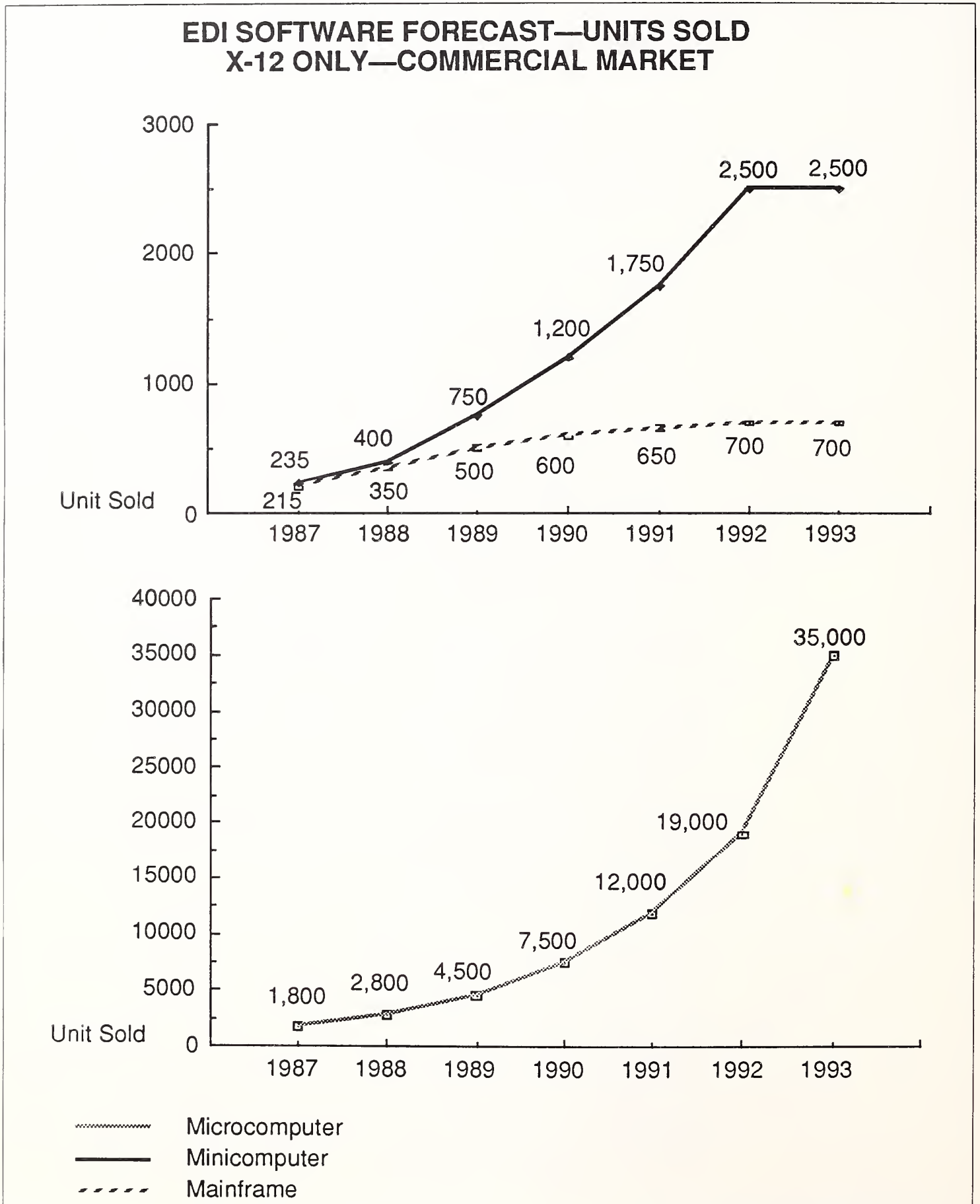


EXHIBIT VII-4

EDI SOFTWARE FORECAST—USER EXPENDITURES X-12 ONLY—COMMERCIAL MARKET

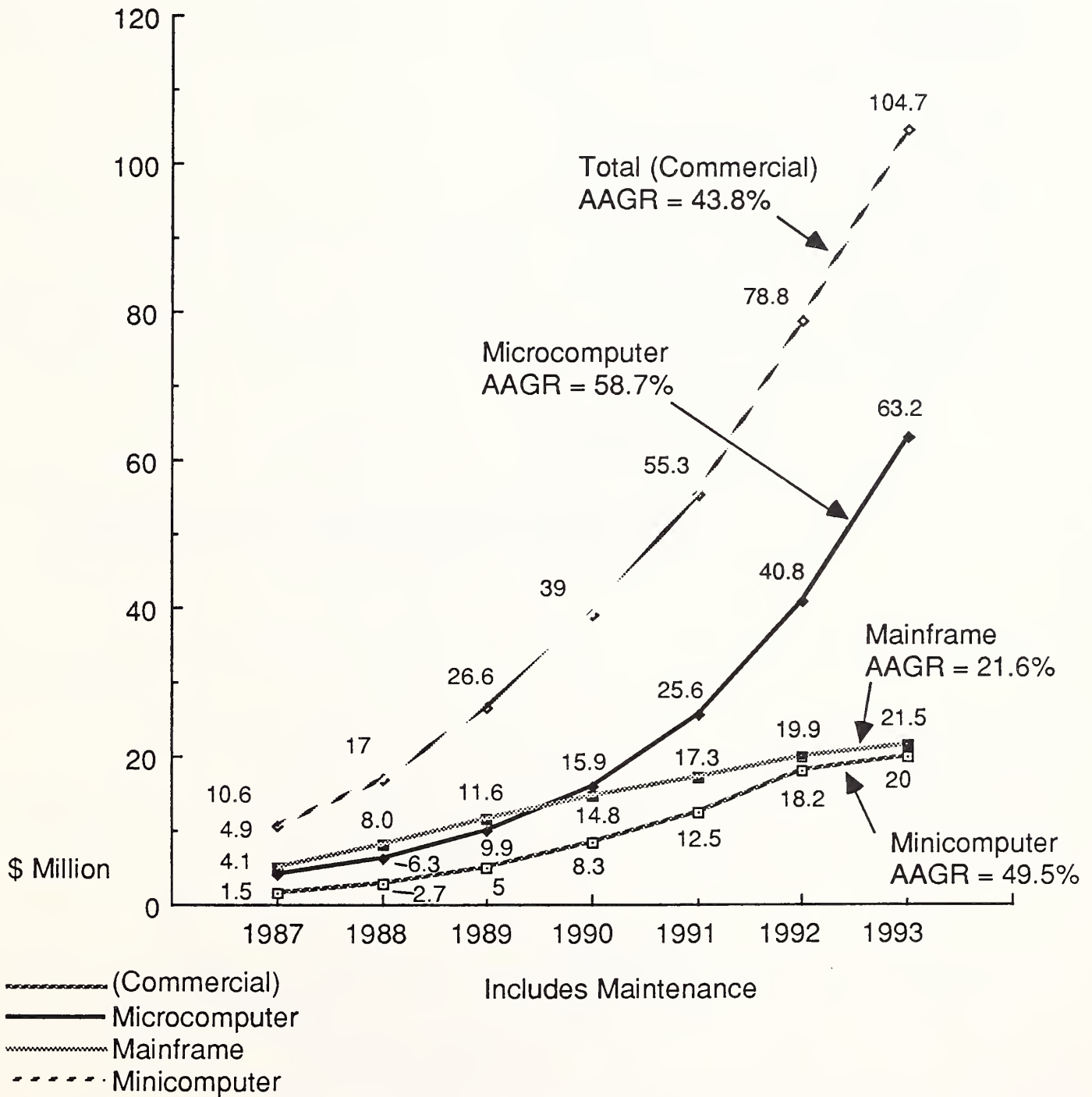


EXHIBIT VII-5

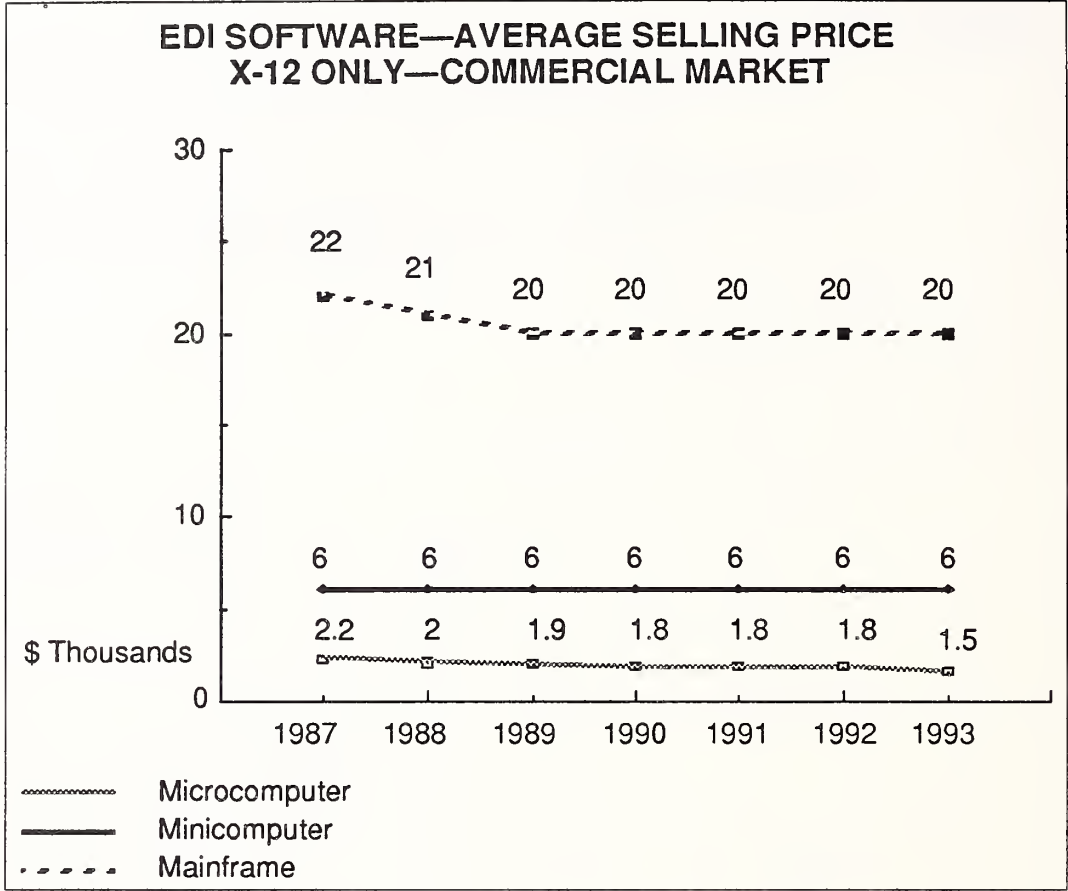


EXHIBIT VII-6

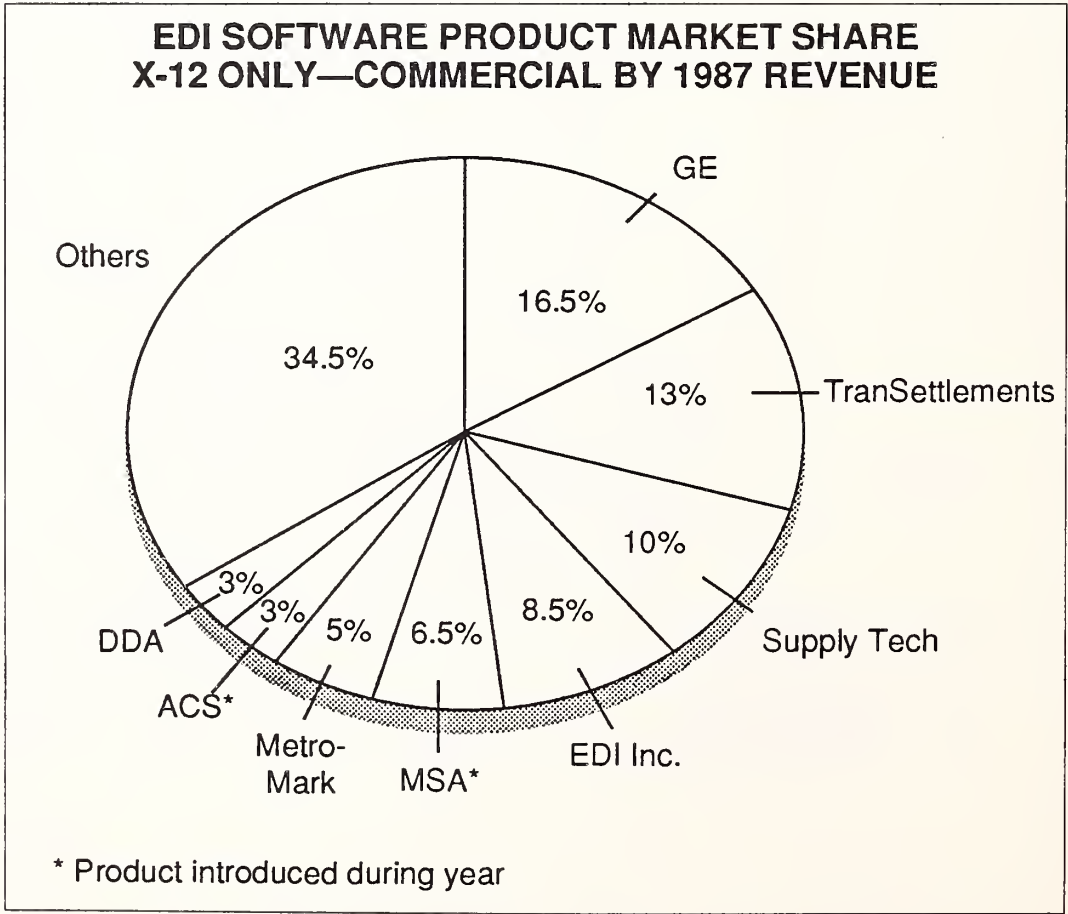
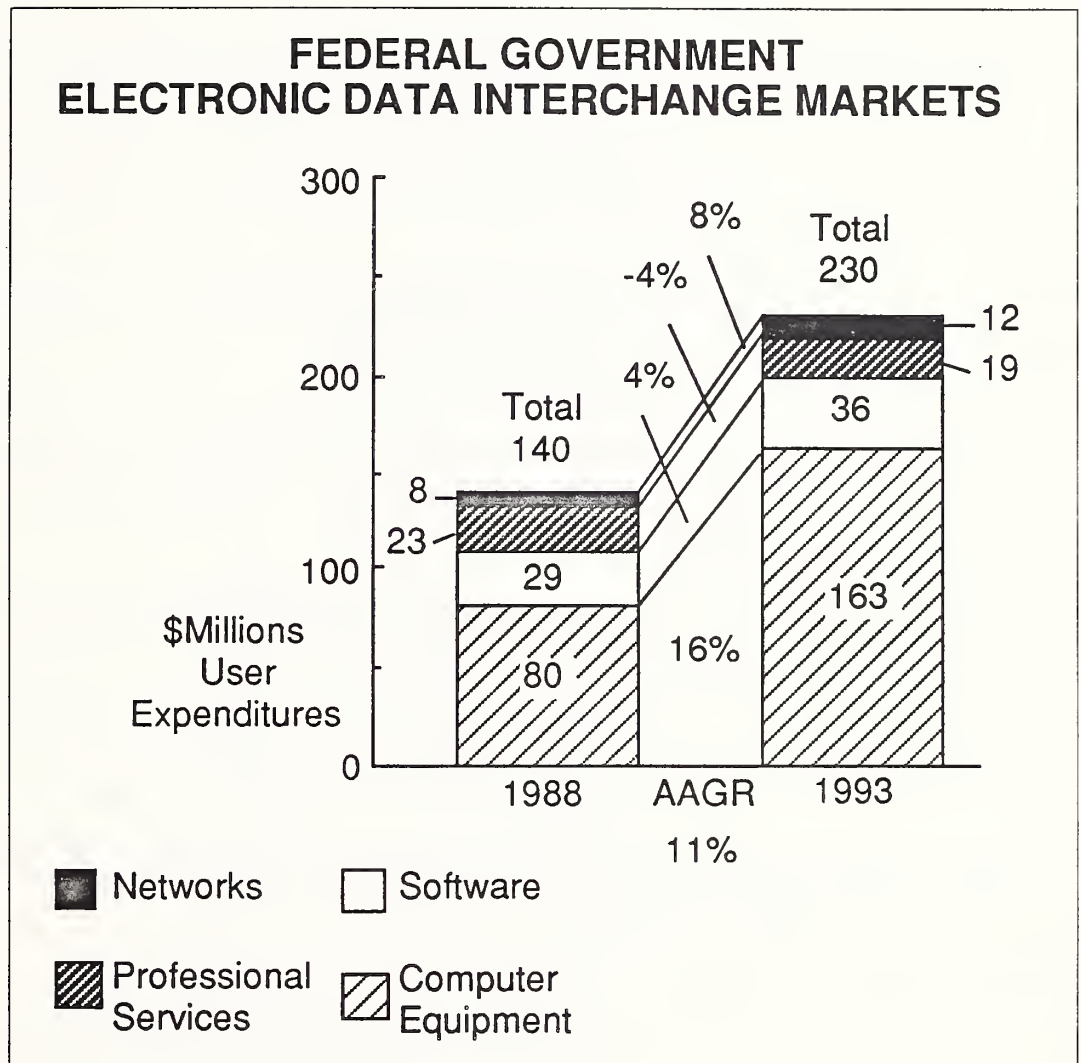


EXHIBIT VII-7



B

Forecast Factors

1. Overall Market Growth

Growth in the overall EDI market will come as more companies adopt EDI, as current users add electronic trading partners, and as users take advantage of additional transactions in their EDI functions. Several usage dynamics support INPUT's overall market forecasts, described more fully in the study, *EDI Service Market Analysis*.

2. EDI Software Forecast Factors

Projecting the future market for EDI software is complicated because EDI functionality will likely be integrated with other applications.

Accordingly, the forecast presented here includes the incremental price users will pay when purchasing applications with integrated EDI capabilities.

The forecast also includes the first year's maintenance fees associated with buying an EDI package, and an annual 12% (of the purchase price) software licensing fee that covers maintenance, updates, and standards revisions for the second year and beyond. It is expected that recent and newly installed packages will be used throughout the forecast period.

- This maintenance fee works like an annuity and increases over time. Vendors can expect this income to increase due to the growing number of installed packages.

Also included in the forecast is the communications interface software and the administrative function when these items are sold with the package; however, terminal emulation boards (when required) are specifically excluded.

The forecast covers only software supporting the X12 standard, although the software may support other EDI standards as well.

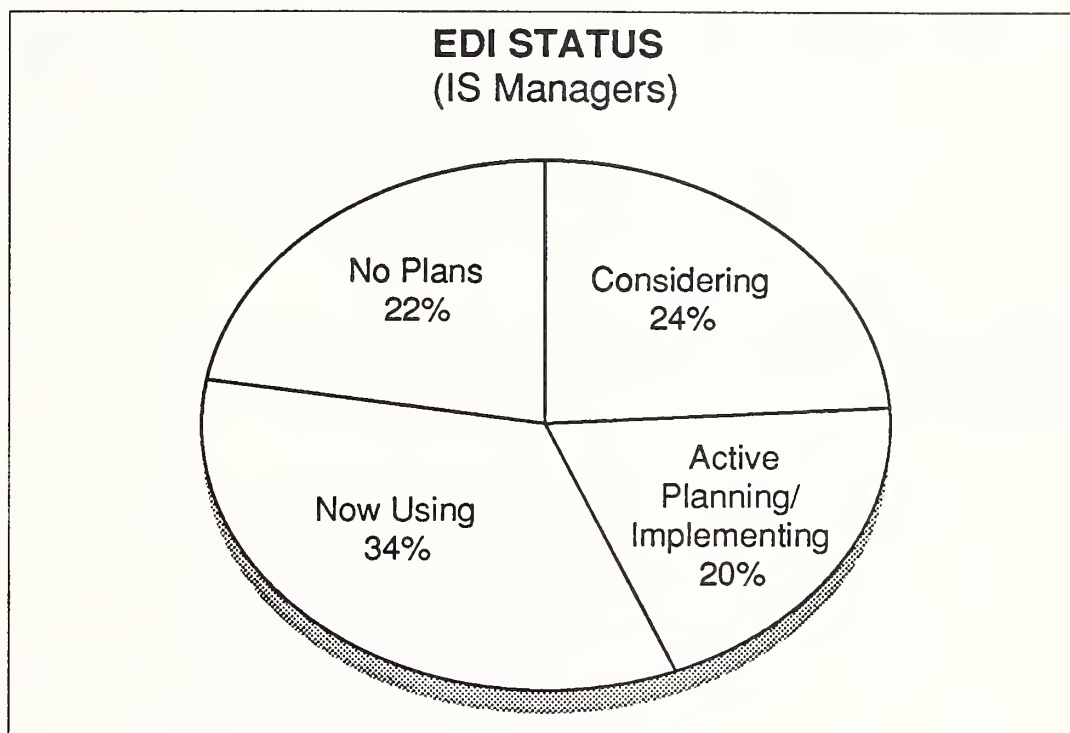
- There are several companies offering private or industry-specific EDI software (e.g., in the grocery industry).
- INPUT believes new EDI users will predominantly use the X12 standard, whereas those requiring and using earlier formats have already purchased software, or developed it themselves.
- Replacement software will likely support the X12 format (as well as others such as EDIFACT)—permitting a migration to X12, allowing interindustry trading, and eventually supporting EDIFACT for international and perhaps all EDI trading.

3. EDI Status

Excluding EDI project managers, of the over 200 IS managers interviewed, approximately one-third (34%) said they are now using some form of EDI. An additional one-fifth (20%) reported active planning and implementation of EDI projects, while nearly one-fourth (24%) said they are considering EDI implementation.

As shown on Exhibit VII-8, 22% of the interview respondents reported no plans to implement EDI.

EXHIBIT VII-8

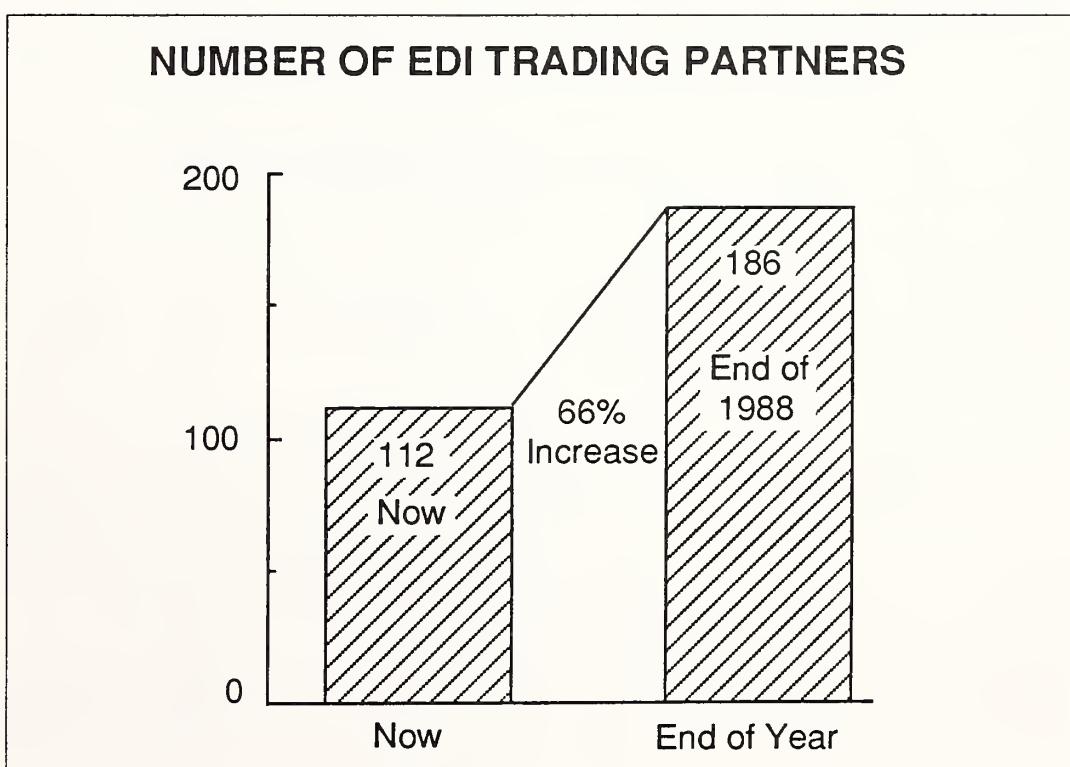


4. Average Trading Partner Additions

Users were asked to provide the number of EDI trading partners they have now, and the number they will be adding in 1988.

On average, users reported 112 EDI trading partners, adding 74 in 1988, for an increase of 66%, as show in Exhibit VII-9.

EXHIBIT VII-9



This finding illustrates the so-called “domino” effect. Large users at the center of a trading cluster may coerce their suppliers to adopt EDI as a condition of continued business. These suppliers may also require EDI from companies on the third tier of the distribution chain. This is found predominantly in the auto industry; however, companies in other industries are also mandating EDI.

C

EDI-Driven User Expenditures—The “Shadow” Market

Users were asked to provide information on their internal activities and expenses in support of EDI systems, and on their expenditures for EDI-stimulated development.

Systems which were impacted by EDI implementation included accounting, order entry, distribution, bar coding, invoicing, and related business systems.

In many cases, EDI-stimulated work surpassed actual EDI project costs. Internal costs, estimated by users in actual expenditures or in man-days of effort, are not directly available as revenue to the marketplace vendors. However, there may be occasions when some of these internal expenditures could be converted by vendors into market-available revenues.

As Exhibit VII-10 shows, users reported an average of \$44,000 or 10 man-months of effort, on EDI-stimulated projects, with some reporting up to \$250,000 (and three years of effort) in such activities.

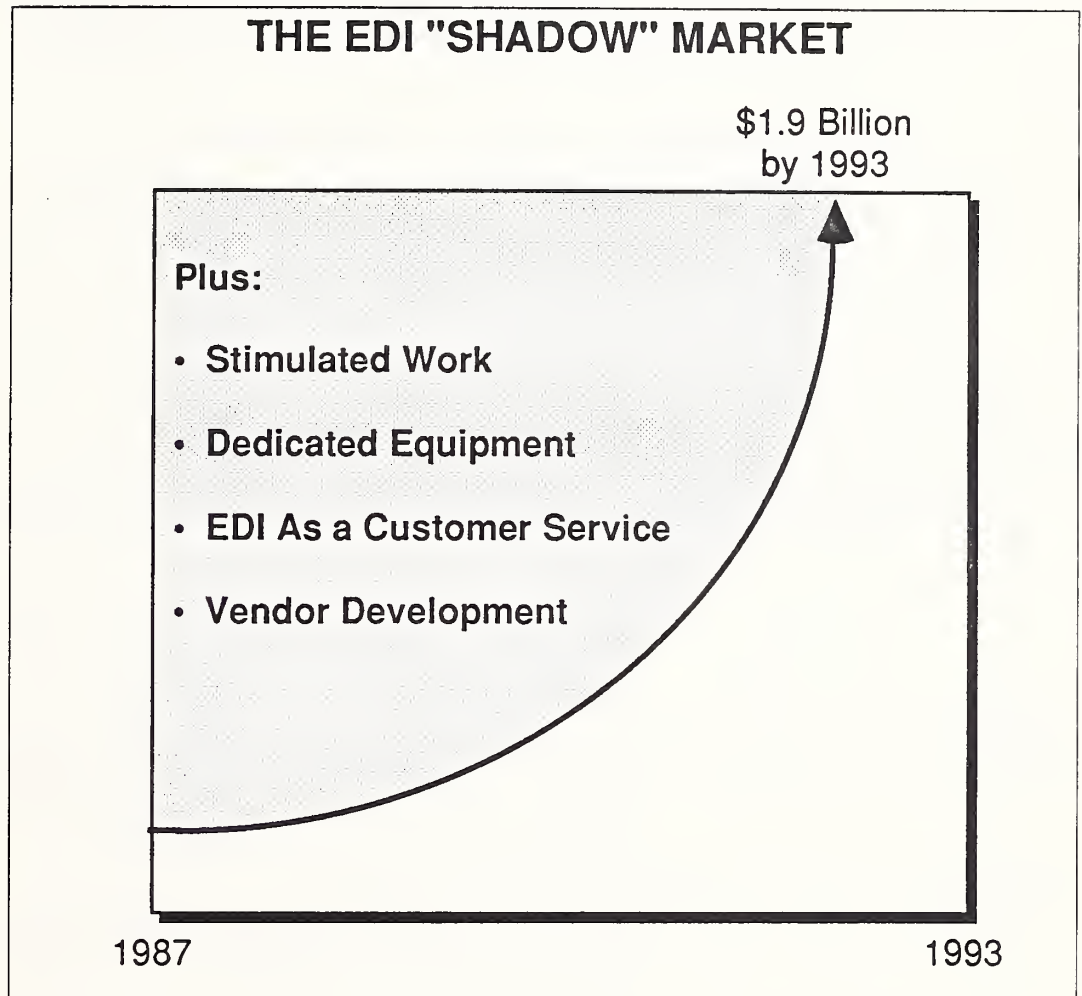
EXHIBIT VII-10

EDI-STIMULATED DEVELOPMENT	
Average	Range
\$ 44 K	\$3,000—\$250,000
10 Months	2 Weeks—3 Years

- The professional services component of the total market forecast is an estimate of EDI-development-related end user expenditures, but excludes EDI-stimulated development.
- Also excluded in the market forecast are expenses by EDI service and software providers in developing their offerings and EDI offered as a customer service by firms such as transportation carriers.

Exhibit VII-11 illustrates this "shadow" EDI market, representing internal development costs for EDI and EDI-stimulated end user developments, and the other expenditures described.

EXHIBIT VII-11



Clearly EDI-stimulated development and add-on packages supporting EDI-related functions are an additional opportunity for the vendor community.

The relationship between EDI, EDI-stimulated projects and professional services will be further examined in an upcoming report, *EDI and Professional Services*.

D

Forecast Reconciliation

Exhibit VII-12 shows the differences between the current forecast and INPUT's 1987 EDI software forecast.

The current forecast shows a higher present market sizing and maintains a substantial average annual growth rate throughout the forecast period, but at a lower level than previously forecast. There are several reasons for this change:

EXHIBIT VII-12

EDI SOFTWARE FORECAST RECONCILIATION FEDERAL AND COMMERCIAL

1987 MARKET			1992 MARKET			1987- 1992 AAGR Forecast in 1987 Report	1988- 1993 AAGR Forecast in 1988 Report
(\$ M) 1987 Report	(\$ M) 1988 Report Sizing of 1987	Variance as Percent of 1987 Forecast	(\$ M) 1987 Report Forecast	(\$ M) 1988 Report Forecast	Variance as Percent of 1987 Forecast		
9.7	28.6	299	88.2	112.8	128	55%	25%

- The average selling price of EDI software packages has been maintained at a higher level than previously forecast. As in the general software market, EDI packages will likely be enhanced with new features, and prices on the mainframe level have in fact been increasing recently. INPUT believes that competition will work to moderate prices. As EDI functions are integrated into applications, the value-added worth will also tend to moderate.
- The annual maintenance/licensing fee has been increased since last year. By its nature, EDI software will require frequent updates due to changes in the EDI standards.
- The current federal EDI market was previously undersized. However, based on INPUT's analysis of federal agency budget requests, the federal market will exhibit a substantially lower growth rate than the commercial market. This significantly suppresses the overall market's growth pattern.

E

Opportunities for EDI Software Providers

1. Software Tools, Utilities, and Integration Opportunities

EDI administrative software has started to appear separately from EDI translators and integrated with them. It may be desirable to see functions, such as those described below, integrated into specific packages to increase utility and differentiate products.

a. Assisted Mapping

EDI software requires users to map data from their applications to the translator. If multiple standards are used, then mapping is required for each standard. This increases implementation time and complicates maintenance.

Needed are automated mapping utilities to speed this process.

Such utilities could be standardized and packaged for popular applications in order processing, purchasing, logistics, and accounting.

b. Bar Coding and EDI

Supply-Tech has integrated bar coding with EDI functions, predominantly for use in the automotive industry. However, applications in other manufacturing industries and retailing will undoubtedly benefit from this integration. The data input through bar-code scanning becomes the data used for the EDI application.

c. Electronic Standards and Trading Partner References

National Systems (New York, NY) has created a diskette-based data base of existing EDI standards enabling users and developers to validate their implementations.

One developer interviewed by INPUT suggested that this information be made available on-line from, or with the endorsement of, the standards-keeping organizations.

- This suggestion, being considered by at least one standards organization, would ensure that the latest standards versions were readily available, and it would obviate the need for rekeying.
- It is ironic that EDI standards, supporting paperless procedures, are only available in paper formats from the standards groups.

EDI administrative software that profiles the user's trading partners regarding networks used, formats supported, etc. is currently available from Carole Baggerly & Associates (Claremont, CA).

d. Electronic EDI Audit Tools

EDI tools enabling auditors to examine transaction data base records appear to be needed. Such tools, enabling accounting personnel to follow the electronic version of the "paper trail," would ideally work with both EDI created/received data and any parallel paper-based system. A dual system as suggested would be able to detect duplicate paper and elec-

tronic transactions, and would simplify the audit process through a unified approach.

Such a system could be enhanced with artificial intelligence capabilities to determine if EDI practices are in keeping with corporate policies and standard accounting procedures.

e. Tighter EDI Integration

Although many if not most EDI software companies claim their products are “fully integrated,” the fact that EDI translation is usually attached to user applications as an external module suggests *prima facie* this is not entirely true.

This lack of integration is also found within the EDI function. Recall that the primary EDI software functions are translation, administration, and communications. In many cases, these separate functions (particularly translation and communications) are individual modules that may have been sourced from separate developers.

Ideally, a fully integrated EDI package or other application with EDI functions would share a common development history and architecture. However, one developer interviewed by INPUT cautioned that integrated products may be difficult to support because of their complexity.

f. A Fresh Start

Most existing EDI software products (and indeed, the software driving several EDI services) trace their origins from the TDCC source code. Performance improvements may be found by essentially writing EDI software from scratch and taking a fresh, completely table-driven approach since hard-coded translation software is difficult to maintain. In addition to providing a new platform for EDI functionality, this “fresh start” approach would be a market differentiator.

These points are summarized in Exhibit VII-13.

EXHIBIT VII-13

**EDI OPPORTUNITIES—
TOOLS, UTILITIES, INTEGRATION**

- Assisted Mapping
- Bar Coding and EDI
- Electronic References
- Electronic Audit
- Tighter Translation-Communication-Administration Integration
- A Fresh Start Toward Performance Improvements

2. Industry Opportunities

Although competing EDI market participants are addressing most segments of the market, INPUT is aware of several areas worth further examination.

a. Reinsurance

Reinsurance companies provide insurance for insurance companies, spreading risks among several firms. The industry's paperwork requirements are weighty, with labor-intensive analysis required to determine individual company exposure in the event of a claim. EDI services adapted to this industry are being examined, principally in Europe with the RINET project, which was awarded to IBM. Software supporting this variety of EDI will also be needed.

b. Insurance and X12 Links

INPUT has identified two areas where links between the Insurance Interface variety and the X12 variety of EDI can be applied to basic business problems:

- Although most shippers and their carriers hold blanket insurance policies, there may be occasions when transported materials require special handling and accordingly, insurance coverage riders. These situations include high-value products or dangerous materials.

- Mortgage bankers are beginning to develop X12-based transaction sets covering Computerized Loan Origination (CLO). Among transactions needed are those for title and other types of real estate insurance.

Only a few software packages fully supporting EDI Insurance Interface are available. No one in services or software has addressed the X12-to-insurance opportunity.

c. International Trade

As INPUT's study, *International EDI* reported, the international trade function is highly complicated, a condition ripe for automated solutions.

INPUT is aware of only two international trade software companies that have incorporated EDI functions:

- Syntra (New York) attaches either GE's EDI*PC or EDI Inc's Telink PC translator to its application.
- H.B. Ulrich and Associates (Melville, NY) has developed its own EDI software module, called EDI-Flex, for its IBM System/36 and System/38 minicomputer trade software.

As noted in the section on banks as prospects, some Export Trading Companies owned by banks are offering EDI software for limited applications, typically in support of electronic letters of credit preparations and transmission.

d. International Markets

European EDI software is available from some of the third-party services there. Software is also sold by the U.K. trade facilitation organization Simplification of International Procedures Board (SITPRO) with Interbridge and SPEX packages, Systems Designers PLC, Gellschaft Fur Logistik und Information Systeme MBH (GLI—West Germany) with Intertex TDI, and large user organizations such as Phillips and Volkswagen.

Although the European EDI market appears well populated, opportunities may still be found for U.S. vendors. Additional opportunities will be found as other regions approach EDI implementation. It will be easiest to adapt existing software to these regions using English—Australia and New Zealand in particular.

Asian markets are showing signs of EDI activity, particularly Singapore, Hong Kong, Korea, and Japan. However, EDI software using the Kanji character set will likely be required, particularly for domestic use (i.e., not international trade). Several U.S. vendors interviewed by INPUT

said they were examining the prospects of translating their translators into Japanese.

For an evaluation of several overseas markets, see the INPUT study, *International EDI*.

e. Market Niches—An Example

Several industries will eventually require EDI software joined to market-specific application software. For example, there is evidence that EDI usage is starting in the advertising industry.

As in many industries, there are unique measurements and business conditions that apply to the advertising segment. EDI software could be associated with advertising agency time-buying applications, adapted for print, radio, television (both broadcast and cable), and outdoor advertising.

Due to technological advances, it may be possible to associate the actual advertisement with an EDI advertising purchase. High-quality color facsimile capabilities for print advertising, digitized audio and video for broadcast/cable usage, and perhaps drivers for creating outdoor advertising displays may follow today's experimentation with EDI and CAD/CAM graphics integration.

These industry opportunities are summarized on Exhibit VII-14.

EXHIBIT VII-14

EDI OPPORTUNITIES— INDUSTRIES

- Reinsurance
- Insurance/X-12 Links
- International Trade
- International Markets
- Market Niches

F

Market Observations

1. A Fragmented Market

As illustrated in this study and the companion report, *EDI Software Provider Profiles*, the EDI software market is a fragmented one, largely inhabited with smaller, entrepreneurial firms and several major applications vendors recently adding EDI to their product mix.

Entering the marketplace this past year are several major software firms: McCormack & Dodge, Pansophic, and ASK, which have approached the EDI opportunity through a variety of alliances and partnerships. They join MSA, which had a year's head start on the others.

Still missing are most of the major computer manufacturers that also offer software.

- It is likely DEC will enter shortly.
- Other mainframe computer makers are known to be evaluating the marketplace, largely in response to customer inquiries rather than in a proactive planning strategy.
- As noted earlier, IBM's approach to EDI software is largely through the Marketing Assistance Program in association with its EDI service.
- Control Data is the only computer manufacturer with its own EDI software. However, its software is offered through its EDI service rather than its application divisions.

The installed base of EDI software is relatively small, and although those attaining market leadership positions can be identified, it is inappropriate to identify any firm as a clear winner at this early date.

Sales volumes are still low, and there is little evidence of bulk sales, although this is the strategy of several vendors.

As the EDI market matures, more partnering is likely, and acquisitions are probable. The alliance-forming period is not over.

2. Multiple Solutions Are Available

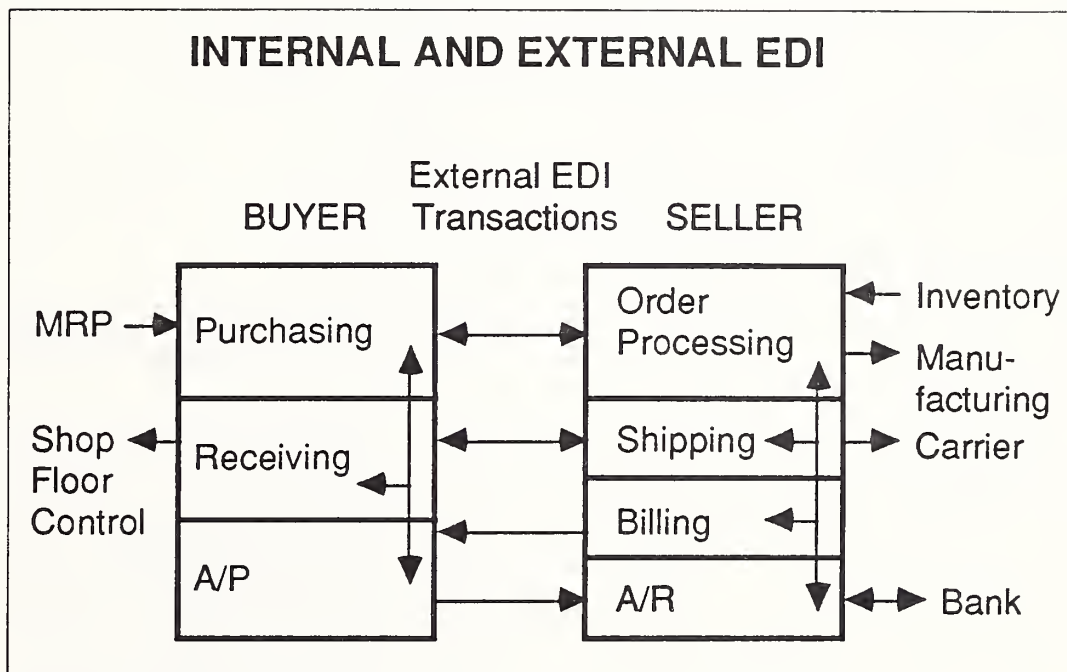
No one software solution appears to dominate the market, although there are more product offerings for microcomputers. In fact, the microcomputer segment is probably overpopulated and due for a shakeout.

The indications are that most new activity in EDI software will be in minicomputer software and perhaps UNIX-based applications. The

barriers to entry are high on the mainframe level, and it is unlikely many new competitors will emerge. Instead, other software companies will likely adapt existing products (as has MSA) to meet their customers' requirements.

Increasingly, software companies are addressing what can best be called "internal EDI," the need to communicate between divisions of a multilocation enterprise prior to an external EDI exchange. These links are illustrated in Exhibit VII-15.

EXHIBIT VII-15



Generic solutions appeared on the market first, but now there is increasing development of integrated solutions that include EDI functionality with inventory, purchasing, distribution, cash management, and other appropriate applications. Integrated solutions will be the wave of the future.

3. Market Awareness Is Growing

Exhibit IV-2 shows how interviewed users rated their awareness of EDI in four INPUT surveys since 1985. This past year's findings indicate a substantial jump in EDI awareness.

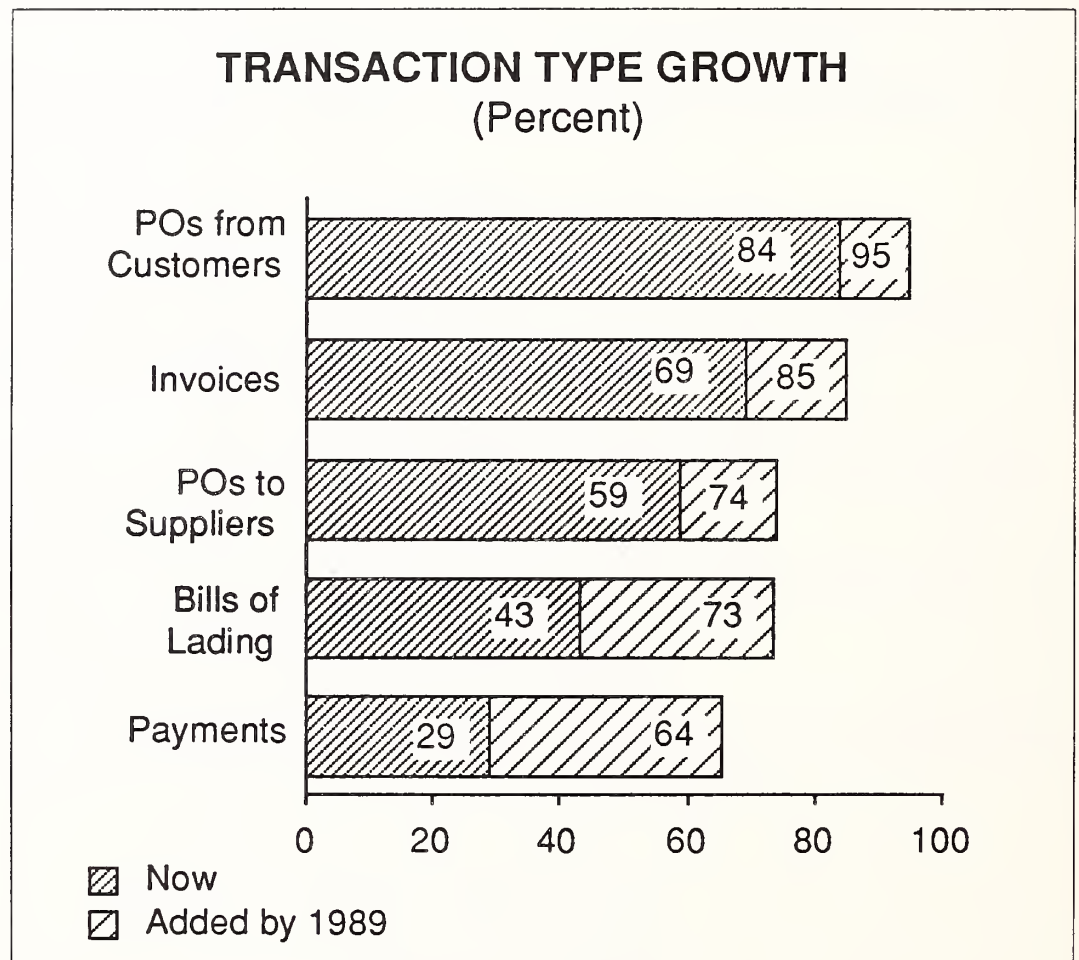
However, EDI is not only an IS concern. In addition to functional departments, corporate management needs to be sold on the EDI solution. There is evidence that even in industries where one would assume a high degree of awareness (e.g., electronics), senior executives have yet to hear the EDI message.

4. Usage Is Limited to a Few Transaction Sets

Currently, invoices and purchase orders are the dominant transactions used in EDI implementations. The full benefits of the method will not be recognized until additional transaction sets are used. This can be accelerated through corporate mandates to use EDI throughout the organization and will result in enhanced EDI functionality, with prepared vendors reaping the benefits.

Exhibit VII-16 shows which transaction sets are now used, and which will likely be added in 1989, based on INPUT's research.

EXHIBIT VII-16



G

Standards Interfusion

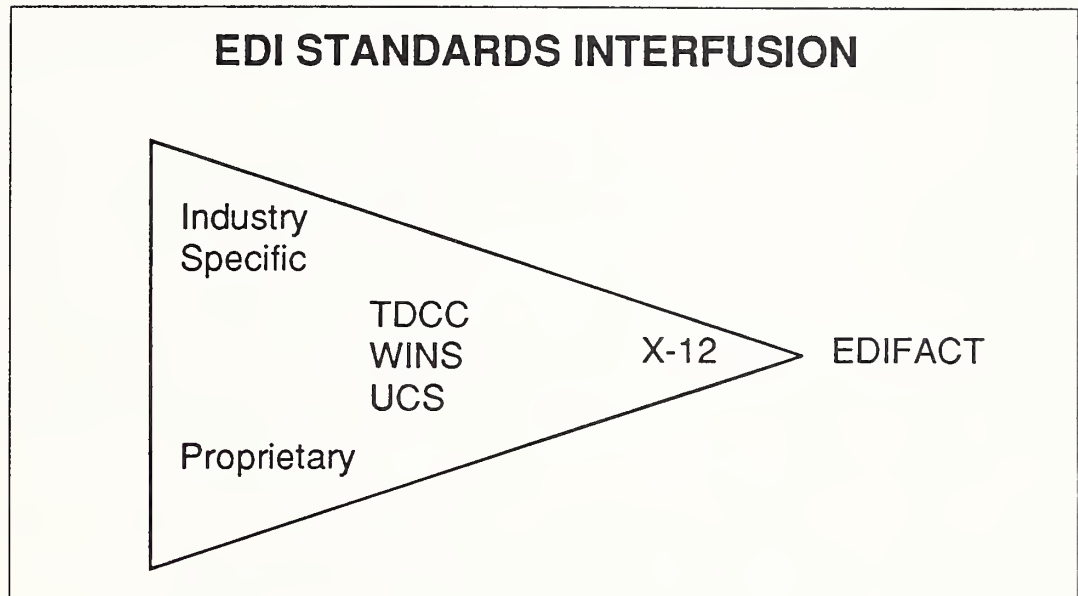
INPUT believes that current user concerns regarding EDI standards will subside as users of proprietary and industry-specific EDI standards move toward X12, and as X12 itself migrates toward the EDIFACT international standard. There is evidence this is now occurring.

- For example, the Secretariat of the grocery standards organization (UCS) is also administering the X12-based VICS (retailing) standard.

- Users of industry-specific formats such as Ordernet (wholesale drugs) are also starting to use the X12 standard.

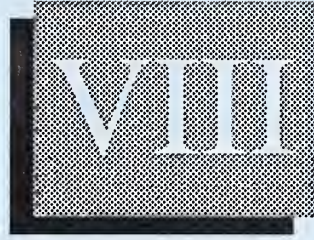
Standards interfusion is illustrated in Exhibit VII-17.

EXHIBIT VII-17

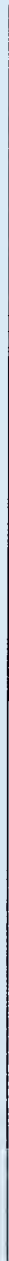


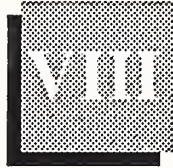
Regardless of the migration, convergence, and interfusion of standards, INPUT believes that as users become more familiar with EDI formats, the concerns reported in this study will diminish.

The next chapter provides recommendations to users and EDI software providers and concludes the study.



Recommendations





Recommendations

This chapter provides recommendations to users and vendors relative to EDI, and concludes this study of EDI software.

A

User Recommendations

1. Sell EDI Internally

Because of the range of options available to users, and because EDI will affect various corporate functions, the first step should be to form an EDI task force with broad company representation to work across departmental lines and avoid internal jurisdictional problems.

- The task force should educate management on EDI's benefits and request funds for its development.
- Information about EDI and specifically about competitors' EDI usage should be used to support the effort.

2. Attack the Backlog

As shown earlier in Exhibit V-2, the general systems development backlog for most companies has increased this past year.

If the applications backlog or the need to involve multiple departments causes problems in planning the EDI implementation, assistance is available from industry associations, network services, software firms, and professional service firms.

These points are summarized in Exhibit VIII-1.

EXHIBIT VIII-1

USER RECOMMENDATIONS

- Form an EDI Task Force
- Apply Competitive Intelligence to Sell Management
- Get Help IF Needed

Further experience-based recommendations to users will be found in INPUT's study, *EDI Implementation Case Studies*.

B**Vendor
Recommendations****1. Take Advantage of Increasing Market Awareness**

As shown earlier, EDI awareness has made a substantial improvement in the past year, fueled by press reports, vendors directing more marketing attention to EDI, industry association informational programs, and other initiatives.

However, improvements can be made through general business press articles and advertising targeting corporate management.

INPUT reiterates its recommendation that industry groups adopt an EDI graphic symbol to identify companies using EDI standards. Such a symbol on letterhead, in advertising and marketing literature will enhance corporate imagery and generate EDI awareness.

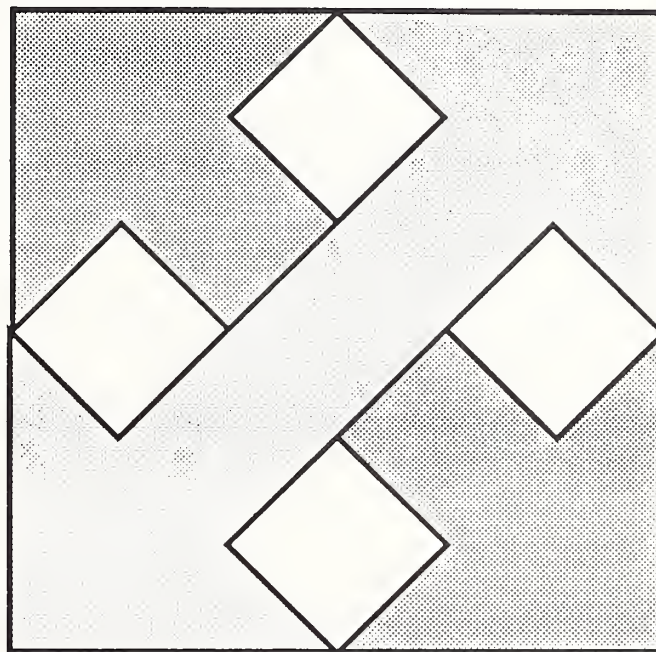
It is worth noting the continuing role of the British Department of Trade and Industry-supported Vanguard program, which promotes value-added data services, including EDI. Information services and users would benefit from a similar approach in the U.S.

This recommendation is shown in Exhibit VIII-2.

2. Investigate Retail Distribution

EDI software vendors have explored a wide range of distribution alternatives; however, retail distribution appears limited to EDI Inc.'s relationship with ComputerLand of Canada. As more companies adopt the method, the common availability of EDI software will follow. Those first with "shelf space" will have an advantage.

EXHIBIT VIII-2

**CENTRAL RECOMMENDATION:
PROMOTE AWARENESS**

- Promote the EDI Solution
- Adopt an EDI Symbol

3. Avoid Being “Typecast”

Several EDI software companies have produced EDI or application software for specific markets, such as the automotive or apparel industry. The company's success may be related to its ability to overcome its past industry association. This is why, for example, a separate EDI software company called ACS Network Systems was established by Apparel Computer Systems.

Vendors seeking to broaden the market for their EDI products need to acknowledge and resolve this potential issue.

4. Consider a Broad Product Line

Even though one leading EDI software company (TranSettlements) has chosen to focus on its dominant mainframe products, INPUT feels EDI software vendors should offer a full range of software solutions since users have varying needs. The EDI expertise required to sell one product can be economically applied to a broader product line.

5. Continue Alliances

EDI software vendors should continue to develop alliances with computer vendors—Value-Added Dealers and Resellers (VARs and VADs)—to develop turnkey systems, particularly for smaller, possibly uncomputerized users and for industry-specific needs.

Software firms should continue developing strategic partners to build a synergy of complimentary development, marketing, and support organizations. Such alliances may lead to more permanent bonding, such as a merger, at a later date.

Partnering opportunities may be found with networks not currently offering EDI. These include International Record Carriers (IRCs) and the Bell Operating Companies, which will likely offer information services in the future.

6. Participate in X/Open

X/Open is a consortium of vendors working to specify the open, vendor-independent Common Applications Environment based on de facto and international standards.

Software complying with the standard will operate on different hardware after being compiled.

One of the potential vendor advantages of X/Open is a Branding Program which establishes product testing guidelines and identifies hardware and software products meeting the standards.

7. Develop Industry Sectors

Industries that have yet to implement EDI remain opportunities. Several were identified earlier in this chapter.

- Although many industries are at least planning EDI, others have yet to initiate programs.
- It is difficult to identify industries that could not benefit from EDI. Those most suitable are characterized by supplier-broker-buyer relationships and a high volume of repetitive transactions.

Trade associations are an economical way to address whole industries and gain the understanding needed to develop and position products meeting unique user needs. Industry endorsements can further the efforts of vendors.

8. Develop Existing Accounts

Primary prospects will be found in other departments of your current user companies. Solicit referrals to other potential users at all locations in the company, as well as at the company's trading partners.

9. Plan Product Enhancements

With regard to product enhancements, plan integrated capabilities for links to industry-specific data bases, for electronic funds transfers, and for integration with other, related applications.

Investigate links with electronic forms processing systems, such as those provided by Xerox (Rochester, NY), Moore Business Forms (Chicago, IL), and Electronic Forms Systems (Carrollton, TX). The goal of this approach is to integrate EDI with functional department authorization procedures.

10. Investigate Non-IBM Platforms

Research the market for software on other than IBM-compatible computer systems of all types. One specific opportunity may well be the Apple Macintosh as it becomes more accepted in business.

11. Pursue the Professional Services Opportunity

Develop custom programming and systems integration skills, along with other professional service capabilities. These activities may account for as much as 50% of a company's revenues from EDI activities in the near term as new users implement EDI.

Professional services activities need not be limited to EDI. Many users are following initial EDI implementations with applications and system improvements to optimize the benefits EDI makes possible. These professional service trends will be examined in a future INPUT study, *EDI and Professional Services*.

These recommendations are summarized in Exhibit VIII-3.

EXHIBIT VIII-3

VENDOR RECOMMENDATIONS

- Examine Retail Distribution
- Avoid "Typecasting"
- Consider a Broad Line
- Continue Alliance Forming
- Participate in X/Open
- Develop Industry Sectors
- Develop Existing Accounts
- Plan Product Enhancements
- Investigate Non-IBM Solutions
- Pursue Professional Services

12. Turnkey System Opportunities

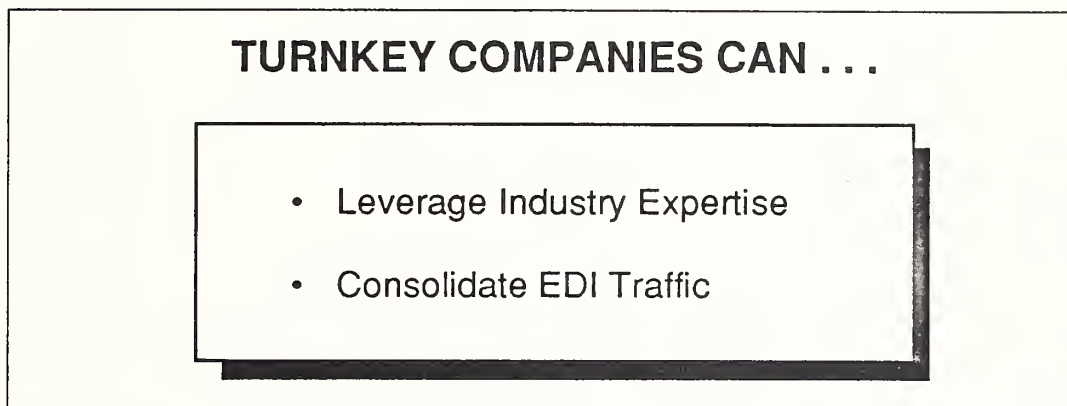
Turnkey systems vendors have several opportunities to add value to their products, and to link with partners to become full EDI service vendors through referral programs and agent relationships.

- Turnkey vendors targeting vertical market niches can leverage their industry knowledge to sell EDI services, software, and professional services to a trading cluster.
- Among those with this opportunity are Triad (Livermore, CA—automotive parts), Trans-Tech (Emeryville, CA—trucking logistics), Shared Medical Systems (Malvern, PA—hospital management systems), and ASK (Los Altos, CA—manufacturing systems). Some have already recognized the opportunity.
- Since several of these firms offer time-shared access to their applications, it may be possible to consolidate EDI traffic through their remote computing facilities for gateway transmission to third-party service providers as a service broker.

- Partnering with network service firms is attractive due to lower entry risks and the specialized, focused market knowledge vendors can bring to a relationship.

These recommendations are summarized in Exhibit VIII-4

EXHIBIT VIII-4



13. Network/Processing Service Opportunities

Although one major EDI service vendor (McDonnell Douglas) has replaced its software marketing effort with a certification program, others are offering their own software.

Although increasing network traffic is the primary objective of these vendors, users require a full solution encompassing software and professional services. If an EDI service provider does not wish to invest in staffing these functions, partnering remains an option.

Appropriate remote computing service (RCS) applications, such as those supporting inventory management, can be enhanced with EDI functionality.

More detailed recommendations to EDI services can be found in INPUT's report, *North American EDI Service Market Analysis*.

C

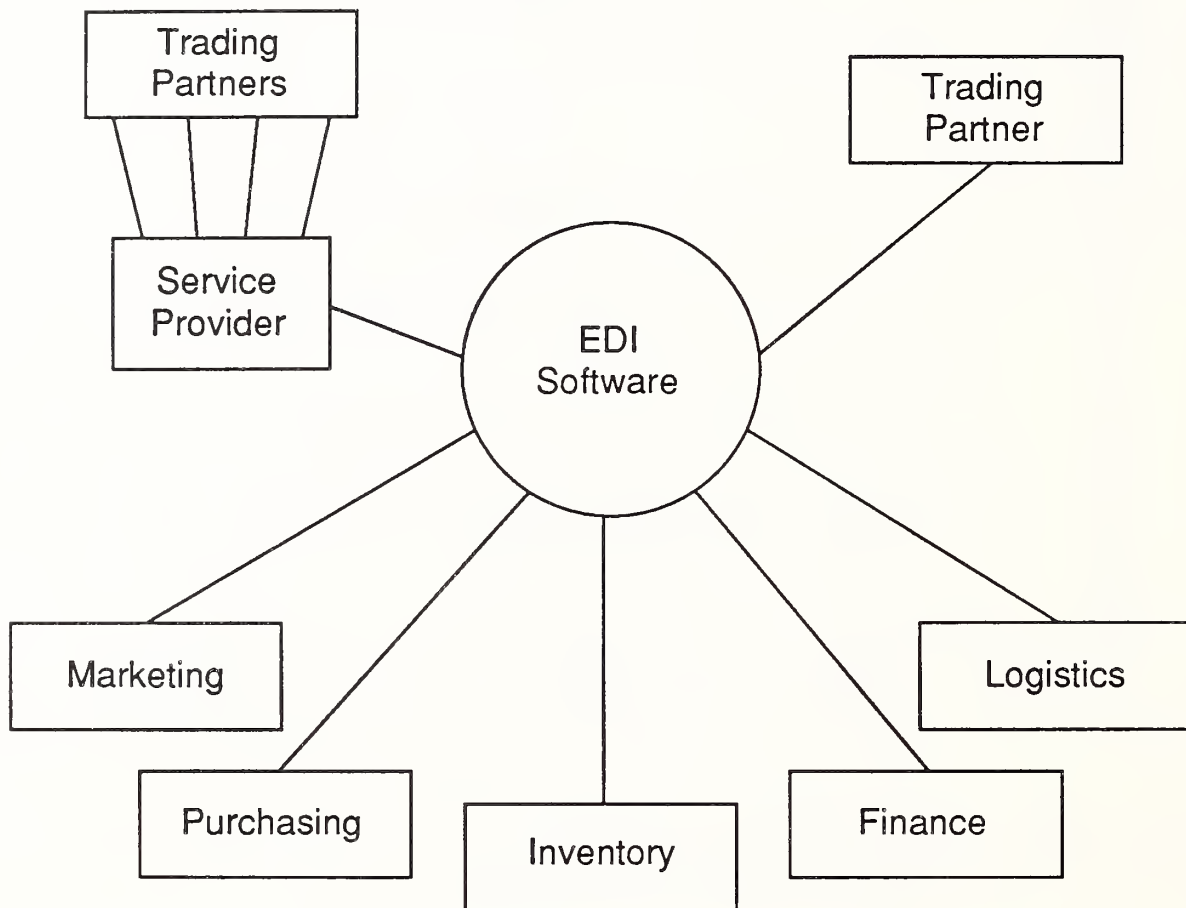
Closing Remarks

As Exhibit VIII-5 illustrates, EDI software is the core of any successful EDI implementation. But it is not an isolated consideration.

Users and vendors are now coming to terms with the complexity that EDI potentially represents. User benefits and vendor opportunities are improved exponentially through the integration of EDI with other applications and other data services.

EDI shows every indication of being poised for explosive growth through wide-scale adoption in many (if not most) industry segments. It represents a revolution from millennium-old paper-based operations, toward

EXHIBIT VIII-5

EDI SOFTWARE IS THE CORE OF THE SYSTEM

an application of appropriate technologies addressing fundamental business needs.

Users are increasingly recognizing that information and its timely flow have value. EDI will impact other methods of managing information: multipart forms, file transfer applications, E-mail, facsimile, overnight courier services, and the U.S. Postal Service. Adjustments will need to be made.

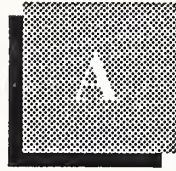
Participants in EDI standards-making bodies are exhibiting something unique in Information Services: competitors are working side by side to come to a consensus approach. These volunteers are showing a near religious zeal for what they are doing and report a sense of satisfaction that may be missing in their regular positions.

Although they are working cooperatively, users are recognizing that EDI brings competitive advantage to those who use it first. It becomes a competitive requirement to all others intending to survive in a dynamic environment.



Appendix: Glossary of EDI Terms





Appendix: Glossary of EDI Terms

ACCS—"Access," the Aluminum Customer Communication System.

ACH—Automated Clearinghouse, a banking industry mechanism for electronic funds transfer. *Also see* NACHA.

AIAG—The Automotive Industry Action Group, a trade association. Also refers to EDI formats developed by the association.

ANA—Article Numbering Association. The U.K. industry group that introduced bar coding to that country and developed the Tradcoms EDI standard.

ANSI—American National Standards Institute.

ASC—Accredited Standards Committee.

Bar Coding—A standardized method of identifying products that facilitates data entry through scanning of coded printed labels.

Batch Processing—A data processing/data communications method that groups transactions. *Compare to* Real-Time Processing.

CAD/CAM—Computer-Assisted Design and Computer-Assisted Manufacturing, a set of applications that use graphics to manage these functions.

CARDIS—Cargo Data Information System, a concept for trade documentation automation promoted by the National Council on International Trade Documentation. Never implemented in its proposed form, "CARDIS Element Systems" have been developed by several vendors serving the international trade community.

CCD—Cash Concentration and Disbursement, an electronic funds transfer format.

CEFIC—The Brussels-based Council of European Chemical Manufacturers, which sponsors an EDI project.

CIDX—Chemical Industry Data Exchange, a standard based on X12.

CLM—Car Location Messages, applied to railcar logistics.

CLO—Computerized Loan Origination. An EDI application being developed by the mortgage banking industry.

Compliance Checking—A function that verifies that document information is received in the right order and in the proper format.

COMPORD—Computerized Ordering, an EDI system developed by the American Iron and Steel Institute.

COPAS—Council of Petroleum Accounting Standards, an industry association developing EDI standards.

CSI—Commercial Systems Integration. A professional service whereby vendors take complete responsibility for designing, planning, implementing, and sometimes managing a complex information system.

CTP—Corporate Trade Payments, an Electronic Funds Transfer application.

CTX—An electronic funds transfer mechanism that is compatible with the EDI X12 standard, and which carries information about a payment as well as transferring value.

DISA—The Data Interchange Standards Association, the ANSI X12 secretariat.

DISH—Data Interchange for Shipping, a project sponsored by a European group of shippers, carriers, and agents.

EDI—Electronic Data Interchange. The computer-to-computer communications based on established business document standards, or using translations by EDI software housed on users' computers, located at remote computer service bureaus or on value-added network processors.

EDIA—The Electronic Data Interchange Association, formerly known as the Transportation Data Coordinating Council.

EDICT—Istel's U.K. EDI service.

EDIFACT—EDI for Administration, Commerce, and Transportation, the evolving international EDI standard.

EDX—Electronics Industry Data Exchange, based on the X12 standard.

EFT—Electronic Funds Transfer, the transfer of monetary value.

Electronic Mail—The transmission of text, data, audio, or image messages between terminals using electronic communications channels.

Electronic Mailbox—A store-and-forward facility for messages maintained by a transmission or processing facility.

EMBARC—An EDI standard being promoted for use in the paper, printing, and publishing industries.

EMEA—Council for Mutual Economic Assistance, an Eastern European bloc EDI association.

FASLINC—The Fabric and Supplier Linkage Council, a textile industry association dedicated to EDI development and other industry needs.

GTDI—General Trade Data Interchange, an international standard, developed from TDI, accommodating compromises of French participants in SITPRO, the agency behind U.N. certification of the standard. Is evolving into EDIFACT.

HCFA—Health-Care Financing Administration, a U.S. government agency responsible for Medicare administration. Also describes a format (HCFA 1500) for health-care insurance claims.

ICOPS—The Industry Committee on Office Products Standards, sponsored by two office products trade associations for EDI applications.

IGES—International Graphics Exchange Standard, by which CAD/CAM graphics can be transferred electronically.

IIR/ACORD—standards for paper and electronic insurance documents, developed by the Insurance Institute for Research and the Agent Company for Research and Development organization, which have merged.

Interface—The insurance industry term for EDI, applied to agent/company communications, ideally using IIR/ACORD formats.

IRC—International Record Carrier, a common carrier providing messaging and network services, no longer limited to international communications.

IVANS—Insurance Value Added Service, provided on IBM's Information Network by an insurance industry association.

JEDI—The Joint Electronic Data Interchange Committee, which consisted of representatives of industry trade associations coordinating development of a reference EDI dictionary for the creation of new EDI transactions, segments, or data elements for international use. Its work has largely been supplanted by UNECE Working Party 4.

JIT—Just-in-time, an inventory management philosophy that plans delivery of needed materials and components immediately prior to final manufacture or assembly.

LDI—Logistics Data Interchange, information about the location of materials in transit through the manufacturing/distribution cycle.

MAPPING—The process of linking specific fields of internal document layouts to an EDI standard by segment, data element, and coded value. This needs to be done for each application receiving or sending EDI data.

NACHA—National Automated Clearing House Association, a banking services industry group.

ODETTE—Organization for Data Exchange through Teletransmission in Europe, an automaker's association EDI standard.

Ordernet—Sterling Software's EDI service. Also refers to EDI standards developed by the National Wholesale Druggist's Association for use in pharmaceuticals.

Rapporteur—Used to describe an expert appointed by the United Nations Economic Commission for Europe Working Party 4, the primary group developing the EDIFACT international EDI standards.

RCS—A Remote Computing Service facility that arranges to process some or all of a user's workload. Similar to a VAN (below) but without network services.

Real-Time Processing—A data processing or transmission method with data entered interactively. Response to input is fast enough to affect subsequent input. The results are used to influence a currently occurring process.

SAFLINC—The Sundries and Apparel Findings Linkage Council, an association in the apparel and related industries promoting EDI and other industry needs.

SAM—Shippers Administrative Messages, a logistics service/application.

Secretariat—The administrative organization providing business and coordination services for various EDI standards creating and maintenance bodies.

SITPRO—Simplification of Information Trade Procedures, a European EDI standards and trade facilitation agency that reports to the Department of Trade and Industry.

SMMT—Society of Motor Manufacturers and Traders. An automotive industry association responsible for the ODETTE project.

Store and Forward—The capability of a transmission or processing facility to hold messages or data until requested, or until a prescheduled time.

SUPER—Study for the Utility of Processing Electronic Returns, an Internal Revenue Service test for electronic filing.

SUPERB—The IRS' electronic filing test program for business returns.

TALC—Textile/Apparel Linkage Council, a subcommittee addressing EDI standards.

TAMCS—Textile/Apparel Manufacturer's Communications Standards.

TCIF—Telecommunications Industry Forum, an industry group involved in EDI, bar coding, and similar technologies.

TDCC—The Transportation Data Coordinating Committee, an early advocate for EDI, now known as the Electronic Data Interchange Association. Also refers to U.S. EDI standards.

TDI—Trade Data Interchange, an international shipping standard. *Also see* GTDI.

TEDIS—An EEC program to promote Trade EDI throughout industry and government.

Tradanet—An ICL (U.K.) EDI service.

Translation—Transforming information sent in one format to another format.

UB82—A format for health claims insurance submissions.

UCS—Uniform Communications Standards, the EDI standards used by the grocery industry, based on X12, and coordinated by the Uniform Product Code Council.

UNECE—United Nations Economic Commission for Europe. Despite its name, a broadly based representational body developing the international EDI standards called EDIFACT.

UNJEDI—United Nations Joint EDI committee developing technical and procedural standards on EDI.

VAN—Value-Added Network. A common carrier network transmission facility, usually augmented with computerized packetizing, which may also provide store and forward switching, terminal interfacing, error detection and correction, and host computer interfaces supporting various communications speeds, protocols, and processing requirements.

VANGUARD—A U.K. Department of Trade and Industry sponsored awareness and promotional program for VAN and EDI services.

VICS—Voluntary Interindustry Communications Standards, a committee developing EDI standards between retailers and manufacturers.

WINS—Warehouse Information Network Standards, promoted by two representational associations, the International Association of Refrigerated Warehouses, and the American Warehousemen's Association.

WP4—Working Party 4 of the Economic Commission for Europe, commissioned by the U.N. to develop trade facilitation procedures and international EDI standards.

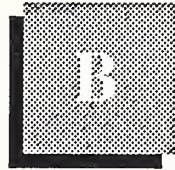
X.400—An international electronic messaging standard.

X12—A set of generic EDI standards, approved by the American Standards Committee.



Appendix: User Questionnaire





Appendix: EDI User Questionnaire

My name is _____ and I'm calling from INPUT, a Market Research Firm in California. We have a special research program in Electronic Data Interchange, and I understand you are using EDI. Is that correct?

If you have a few minutes, I'd like to ask you some questions which are designed to help improve EDI services and software. The results of our survey will be read by the companies offering EDI products. By the way, we won't be identifying you or your company in this survey, only the aggregate results. In exchange for your help, I'll send you a summary of our survey. Fair enough?

1. Can you tell me **when you started using EDI?**

- a. _____ this year (1988) b. _____ LAST year (1987)
c. _____ 1986 d. _____ 1985 or earlier

2. About **how long did it take to you implement** your EDI, once you got started?

_____ 3 months _____ 6 months
_____ longer—how long?: _____

3. Where there any particular **problems** that stick out in your mind regarding getting your EDI system up and running?

4. How did you go about **IMPLEMENTING** EDI? Did you:

- a. Contract with a **THIRD PARTY** to help implement your EDI system?

☐ yes ☐ no

(IF YES ASK:) Why did you take this approach?

[IF YES] Since you used a third party to help you implement EDI, was that third party:
[READ OPTIONS]

- (i) _____ An independent consultant?
- (ii) _____ A professional services firm?
- (iii) _____ An industry association? [IF YES:]
WHO? _____
- (iv) _____ A communications company, such as a value-added network?
- (v) _____ A Remote Computing Service?
- (vi) _____ A financial services organization?

[IF NO] Based on your answer, I assume your staff implemented the system TOTALLY YOUR-SELF? Is that correct?

☐ yes ☐ no

5. Was your EDI **IMPLEMENTATION** MANAGED BY THE FUNCTIONAL DEPARTMENT (such as marketing or order entry), or did **INFORMATION SERVICES (IS)** MANAGE its implementation?
- a. _____ IS b. _____ functional dept. c. _____ committee
 - d. _____ d/k e. _____ other answer: _____

6. Did you start using EDI in response to a major customer or customers, or did you did it for your own reasons?

_____ customers _____ own reasons:

What were those reasons? _____

Communications & Hardware Environment

7. What **TYPE OF COMPUTER** are you using for EDI? Is it a
- a. _____ micro b. _____ a mini or c. _____ a mainframe?
 - d. _____ other
- specify: _____

- 8a. Do you think that the computer equipment you're now using for EDI might **change** in the foreseeable future, say the next two or three years?

☐ yes ☐ no

b. **WHY** would it change?

Comments _____

9a. Are you doing EDI _____ DIRECTLY WITH YOUR TRADING PARTNERS
or do you go through _____ A THIRD PARTY DATA NETWORK?

b. [IF THIRD PARTY NETWORK] Which network are your primarily using for EDI?

_____ AT&T
_____ GEISCO
_____ McDonnell Douglas' Tymnet
_____ Sterling Software's ORDERNET
_____ IBM Information Network
_____ Kleinschmidt
_____ other: _____

10a. On a scale of 1 -5 with five being "HIGHLY LIKELY," HOW LIKELY is it that you would
CHANGE YOUR CHOICE OF NETWORKS FOR EDI?

1 2 3 4 5

b. **WHY** that rating? _____

11. On a scale of 1 -5 with five being "HIGHLY RATED," how would you rate the third party network in terms of:

a. Overall technical quality 1 2 3 4 5

b. Customer support 1 2 3 4 5

c. Price 1 2 3 4 5

d. Cleanness of the bill 1 2 3 4 5

e. Do you have **any specific complaints** about the network you are now using?

12a. On our scale of 1-5, with 5 being HIGHLY IMPORTANT, how important is it for your network vendor to connect with another network. In other words, how important is it for you to send EDI documents to someone who subscribes to another network?

1 2 3 4 5

b. Why that rating?

13a. On a scale of 1-5, how important is it for you to be able to send a **hard-copy** of your EDI document to a trading partner, **THROUGH THE NETWORK...** in other words, have it printed and mailed to the recipient.

1 2 3 4 5

b. How about sending a document to a **FAX** machine... how important is this on the scale of 1-5.

1 2 3 4 5

c. Why did you rate these two, hardcopy and FAX, this way:

14. Could you tell me approximately how much you figure you've spent on EDI services last year? In other words, for using the network you described above? \$_____.

15. As part of your **INTERNAL EDI development** work, I presume you directed some of your people to the project, correct?

☐ yes ☐ no

a. Could you estimate the amount of effort this **internal development** work cost, in a dollar amount? An approximation would be fine. I will be asking about development work in systems linked to EDI, but first, I'd like to get a sense of the work associated with developing **ONLY your EDI capabilities**. \$_____ [IF CAN'T ESTIMATE DOLLAR AMOUNT]
How about in terms of "man-days" or months of effort? _____
(day/months/years - circle which).

b. Now, we know that EDI can **stimulate** other development work, for example, on your purchasing system, order entry or accounts receivable systems. **Has EDI "stimulated" any other internal development work?** Y/N. [IF YES] Could you tell me a little bit about these projects? What systems were involved? _____

Can you estimate the dollar or "man-day" effort associated with these EDI "Stimulated" Projects: \$_____ or _____ days/months/years.

Software

Next, I have a few questions about EDI Software.

16a. Did you **WRITE THE EDI SOFTWARE** yourself, did you **PURCHASE** it, OR did you **BUY A PACKAGE AND CUSTOMIZE IT**?

(i) _____ Write (ii) _____ Purchase (iii) _____ Buy and Customize

b. Why did you take this approach? _____

c. If you purchased software, what vendor did you choose?

d. Why did you choose this particular company?

17. Could we rate the importance of **software features**? On a scale of 1-5, with 5 being very important, how important is it for EDI software to:

a. **BE INTEGRATED** with other business applications such as accounting, inventory, etc.

1 2 3 4 5

b. Support **GRAPHICS**

1 2 3 4 5

c. Be **EASILY USED** by non-computer users

1 2 3 4 5

d. Have **ENCRYPTION** capabilities

1 2 3 4 5

e. Be **EASILY UPGRADED** to new standards

1 2 3 4 5

f. **ACKNOWLEDGE** successful transmission

1 2 3 4 5

g. Report **EXCEPTIONS** clearly

1 2 3 4 5

h. Have a **MAINTENANCE AGREEMENT** for updates/fixes

1 2 3 4 5

18. With regard to **INTEGRATING EDI SOFTWARE** with other applications such as accounting, or purchasing, which is more preferable:

- a. _____ To integrate the EDI software with your other applications **YOURSELF**.
- b. _____ To hire a **CONSULTANT OR PROFESSIONAL SERVICES** firm to integrate the EDI software with your other applications, **OR**
- c. _____ To buy **NEW SOFTWARE** for accounting, inventory, etc. with built-in EDI functionality.

19. What do you think is needed to make EDI software work more closely with your other applications?

20. What **transactions** are you now doing through EDI, and which do you plan to do via EDI, and in what time frame?

<u>Type of Document</u>	<u>Time Frame</u>			
	now	1989	3yrs	d/k
a. _____ Purchase Orders FROM customers	_____	_____	_____	_____
b. _____ Purchase Orders TO suppliers	_____	_____	_____	_____
c. _____ Invoices	_____	_____	_____	_____
d. _____ Bills of Lading	_____	_____	_____	_____
e. _____ Payments	_____	_____	_____	_____
f. Others _____	_____	_____	_____	_____
_____	_____	_____	_____	_____

21a. Do you think there are any additional transactions or information still needed from the EDI standards? Y/N

b. How about any **special needs in your industry** that are not being addressed?

c. Comments:

22. Could you estimate to be your **GROWTH IN THE NUMBER OF EDI TRANSACTIONS**, first between the end of 1986 and the end of last year (1987)? _____ %

23. And how about your **EDI EXPECTATIONS FOR THIS YEAR**...what percentage of growth in transactions would you estimate? _____%
 comments: _____

24. Have you done any **cost analysis**, on a **per-transaction** basis, of your **PAPER BASED** systems for purchase order processing, invoicing or other routine paperwork of this nature? (If yes: What did you find out?)

25. Have you done any analysis of the cost, on a per transaction basis, of any **EDI** transactions? (If YES: What did you find out?)

26. With approximately how many other companies do you exchange **EDI TRANSACTIONS**:
 a. 1-5
 b. 6-10
 c. 11-20
 d. 21-30
 e. 31-40
 f. 41-50
 g. 50+ how many: _____
27. Do you have any estimate of how many additional companies you will be adding to your **EDI THIS COMING YEAR**?
 a. 1-5
 b. 6-10
 c. 11-20
 d. 21-30
 e. 31-40
 f. 41-50
 g. 50+ how many: _____

Issues

This Final Part of the Survey Deals with EDI Issues and Concerns. Do you have just a few more moments?

28. Let me read you a list of issues and problems which we believe people may be concerned about, and ask you for a rating, again on a 1-5 scale, with "5" being "a serious concern" and 1 being "not a serious concern" and get your reaction:

How much of a concern are:

- a. The actions of your COMPETITORS with regards to EDI
1 2 3 4 5
- b. Concerns about the ENTIRE SYSTEM including hardware and software which you may install
1 2 3 4 5
- c. Concerns about the COST of Using EDI
1 2 3 4 5
- d. Network/Data SECURITY
1 2 3 4 5
- e. Software MAINTENANCE
1 2 3 4 5
- f. INTERNATIONAL EDI capabilities, that is, the ability to do business with people in other countries
1 2 3 4 5
- (e.i.) Are you doing any international trading now?
☐ yes ☐ no
- g. Changing BUSINESS PRACTICES, for example managing the change from paper forms to electronic forms
1 2 3 4 5
- h. RELIANCE on ONE VENDOR or Service
1 2 3 4 5
- i. VENDOR VIABILITY
1 2 3 4 5
- j. EDI STANDARDS and COMPATIBILITY
1 2 3 4 5
- k. OTHER CONCERNS? _____
1 2 3 4 5
- l. _____
1 2 3 4 5

THAT CONCLUDES OUR FORMAL INTERVIEW. Is there anything else you think we should consider in our report on electronic data interchange? Are there any colleagues at other companies we might call?

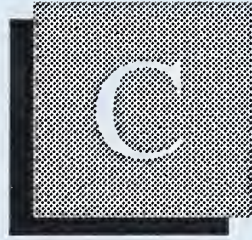
Name: _____ Phone: _____

Thank you very much for your help. Your comments are appreciated, and will help make our report most informative and valuable. We should have the executive summary out to you within 6-8 weeks. Can I verify your address and a little about your company? [INTERVIEWER: COMPLETE COVER PAGE REGARDING SALES REVENUES, NUMBER OF EMPLOYEES AND INDUSTRY SECTOR.]

Thanks again.

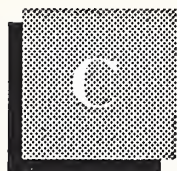
INTERVIEWER: PLEASE EVALUATE THIS RESPONDENT:

a. _____very helpful b. _____somewhat helpful c. _____ not helpful



Appendix: Vendor Questionnaire





Appendix: EDI Packaged Software Vendor Questionnaire

INPUT is updating its directory of EDI software providers and doing an analysis of the market. We want to make sure we have correct information on your EDI Software products. Is now a good time?

I. BACKGROUND

A. Main Business Focus: _____

B. Year Founded: _____

C. Number of Employees: _____

II. EDI PRODUCT(S) DESCRIPTION

A. Date Introduced: _____ Current Release/Version: _____

B. Features: _____

C. Computer Equipment Required/Operating System: _____

D. Memory Requirement: _____

E. Require Emulation Board? Y/N Type: _____

F. Standards Supported: _____

G. Is EDI Translation Integrated with Communications Functions? Y/N If Not, what Communications Software is recommended: _____

H. Is EDI Translation integrated with other applications THAT YOU OFFER: Y/N Which applications: _____

I. Do you provide PROFESSIONAL SERVICES to integrate your software with a customer's applications? Y/N What is your typical charge for this integration on an hourly/daily basis: \$_____ hourly/daily.

J. Can you describe the typical integration project? _____

III. Pricing

A. What is the Average Selling Price of your product(s): \$_____ \$_____
 \$_____

B. Are Volume Discounts Available Y/N

IV. SALES, MARKETING AND DISTRIBUTION

A. Do you sell directly to customers____ or Indirectly ____.

B. IF INDIRECT, Who is now selling your software: _____

C. What are your TARGETTED MARKETS: _____

V. Who do you consider your principal COMPETITORS: _____

VI. PRODUCT DIFFERENTIATION

How do you DIFFERENTIATE your EDI products and your company?

VII. BASE/SALES

A. How many packages do you have in your INSTALLED BASE in the US and Canada: _____
 US _____ Canada _____

B. Approximately how many of these do you estimate were sold by your distributors or partners? _____

(US/CANADA)

C. How many packages were sold in 1987 alone? _____ (US/CANADA_

D. What were your revenues for EDI PRODUCTS \$_____ and PROFESSIONAL SERVICES \$_____

E. What are you PROJECTING for 1988 sales volume for EDI software_____ professional services_____.

VIII: Could you tell me what TRENDS AND DIRECTIONS you see occurring in the EDI market generally, and specifically with regards to Packaged EDI software? For example, do you see more needs for INTEGRATED solutions rather than "stand-alone" products? Do you see more alliances, or mergers happening?

Many thanks for your help. We'll be sending you an executive overview of the report.

